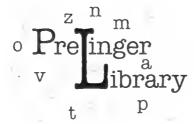


From the collection of the



San Francisco, California 2007

DISCARD

1 4

:			
		6:	

Digitized by the Internet Archive in 2007 with funding from Microsoft Corporation

	•		
		·	i d
ď			
÷			

Electric Railway Journal

Volume 71

January to June, 1928

McGraw-Hill Publishing Company, Inc.

Tenth Avenue at Thirty-sixth Street
New York City

Getting the Most from the Index

HIS is essentially a subject index, not an index of titles, and articles treating a number of different subjects are listed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, city, state or nation. Entries about an electric railway are under the name of the city in which the main office of the company is located.

In the subject index, the alphabetical method is followed. If there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. The headings which appear in the index itself are in small type under the general classifications. The main headings in capitals below do not appear in the index.

As an example of how to use the index, if a reader wishes to locate an article on special trackwork he obviously would look in the list below at the general subject "Track." Under this caption, only "Special trackwork" could apply to the article in question.

The large number of articles brought out on the monthly maintenance data sheets, together with the increasing number of maintenance notes in other issues has resulted in the substitution of three keywords, for indexing items formerly appearing under "Repair shop practice": (1) Maintenance data, under which all articles appearing on the monthly maintenance data sheets are grouped; (2) Maintenance equipment, with classified subheads, under which all articles in the weekly department "New Equipment" are included, and (3) Maintenance practice, also with classified subheads, under which all articles in the weekly department "Maintenance Notes," as well as the articles on the data sheets, are inserted. The heading "Repair Shops and Equipment" has been reserved for general articles on the design of repair shops and their equipment. Otherwise the plan used for many years in the preparation of this index has been followed.

In addition to the groups of articles covered by these headings, papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other associations and societies are indexed in general only in accordance with the subject discussed.

Signed articles also are indexed by the name of the author. When the name of the author is known to the reader this provides the simplest method of locating any article.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND ACCIDENT PREVENTION

Accident claim department Accident prevention Accidents (including wrecks) Insurance, Fire Safety work Storm and fire damage

ELECTRIC CARS AND SERVICE CARS (including car design) Locomotives Service and tower trucks Trackless troiley

CAR EQUIPMENT

CAR EQUIPMENT
Bearings
Brakes and compressors
Doors, car
Electrical equipment for cars
(except motors)
Gears and pinions
Heaters, electric
Lighting and lighting fixtures
Motors, Electric
Resistors
Seats Seats Trolley wheels Trucks Wheels and axles

EMPLOYEES

Education Employees Insurance and pensions Insurance and pensions
Labor
Strikes and arbitrations
Wage decreases
Wage increases
Wages and working agreements

FARES

FARES
Fare collection (including apparatus)
Fare decreases
Fare increases
Fares
Traffic investigations
Traffic stimulation

FINANCIAL, LEGAL AND STATISTICS

STATISTICS

Accounting
Appraisa of railway property
Blanks and forms
Discontinuance of lines
Financial (methods of financing)
Financial reports
Franchises
Insurance, Fire
Insurance and pensions
Legal
Legal
Legislation for railways
Market conditions
Operating records and costs
Public service and regulative
commissions
Statistics
Taxes Taxes

HEAVY ELECTRIC TRACTION

Heavy electric traction (general) Locomotives

MAINTENANCE OF EQUIPMENT

Car cleaning
Lubrication
Maintenance data
Maintenance equipment
Maintenance practice
Motor buses, Practice with Motor buses, Practice with Painting
Repair shop practice; cars and car equipment
Repair shop practice; shop methods and equipment
Repair shops and equipment
Stores
Tests of materials and equipment
Welding

MOTOR BUSES

Motor buses, design
Motor buses, gas-electric
Motor buses, installations
Motor buses, jitney competition
Motor buses, Operating practice
Motor buses, regulation

POWER

Energy checking devices Energy consumption Fuels

POWER—Continued Overhead contact system
Power distribution
Power generation
Power stations and equipment
Power transmission
Substations and equipment STRUCTURES

Bridges Gringes Carhouses and storage yards Loading platforms
Power stations and equipment Repair shops and equipment Substations and equipment Terminais and waiting stations TRACK

Pavements Rail joints and bonds Rails Rails Special trackwork Ties Track construction Track maintenance TRAFFIC AND TRANSPORTATION

Advertising
Customer ownership
Dispatching
Freight and express
Interurban railways
Merchandising transportation
Parking of cars
Publicity
Public, Relations with
Rapid transit (elevated and
subway)
Schedules and timetables
Signals Stignals
Street traffic congestion
Traffic investigations
Traffic regulation
Traffic stimulation Transportation, Metropolitan (general studies) MISCELLANEOUS

European practice
Management
Noise reduction
Railway construction proposed
Railways (general)
Snow and ice removal
Standardization
Wood preservation Wood preservation

INDEX TO VOLUME 71

PAGES BY 155CES Pages	Accounting: —Buffalo, N. Y., Ohmer fare registers installed, 485. —C.E.R.A.A., Work of, Comments on, 346. —I.C.C. depreciation hearings, 520. —Indiana, Appraisal expenditures ruling, 632.	American Electric Railway Association:—Annual Convention (Continued) —Better Copy Contest entered, 292. —Bureau of information: Bulletins, 1001, —Committee activities:
January 14 39 to 102	—Los Angeles, Cal., Manuals of operation and accounting [Jordan], *359. —Stock book for stabilizing stores [Weston].	Current collecting devices, 1001. Education, 953. Electric railway finance, 369.
January 21 103 to 144	*357.	Entertainment, 553. Executive, 206, 223, 588, 781, Exhibit, 183, *251, 782, 882; Comments
January 28 145 to 184	 Widening horizon for accountants, Comments on, 929. Wisconsin, Uniform classification of accounts 	Exhibit, 183, *251, 782, 882; Comments on, 845.
February 4 185 to 224	for motor carriers, 215.	Lighting, 953. Motor brushes, 1001.
February 11 225 to 264	Advertising (See also Publicity): —A.E.R.A. distributes car riding posters. *208. —A.E.R.A. joins Better Copy Contest. 292. —American Water Works campaign, 134.	Motor bus, 706.
February 18 265 to 306	-American Water Works campaign, 134.	Publications, 953, Rolling stock, 129, 952. Street traffic economics, 251; Comments
February 25 307 to 344	—Biddeford, Maine, 1005. —Birmingham, Ala., Service advertised, Details, *15: Comments on, 3. —Columbus, Ohio, Theater service advertised,	Subjects and meetings, 706.
March 3 345 to 384	*330.	—Committee lists published in separate bulletin,
March 10	 Developing new business [Soules], 551, El Paso, Texas, Sightseeing bus service advertised, 1008. 	New members elected, 208, 588, 782. —Railway reports, 1927, 750; Comments on, 723.
March 17	tised, 1008. —Fairment, W. Va., Campaign, 134. —Fort Worth, Texas, Laundry bags advertise	—Railway operating statements, Analysis, 961. —Traffic, fare and wage figures, 98, 596, 677.
March 31	service, 319.	755, 840, 964. American Electric Railway Claims Association:
April 7 567 to 604	service, 319. —Glasgow, Scotland, to allow ads in cars, 415. —Harvard advertising awards: —Harvard h. McGray with 1927 award *268	—Committee appointments, 249.
April 14 605 to 644	James H. McGraw wins 1927 award. *268. Provisions for 1928 award announced, 1015. —Indianapolis, Ind., New cars advertised. *321.	American Electric Railway Engineering Associa- tion: —Committee activities:
April 21 645 to 684	-Investment value of railways advertised,	Car design, 208. Executive, 207, 1081. Power, 292, 1081.
April 28 685 to 720	-Kansas City, Mo., Newspaper advertising campaign, *490. -Little Rock, Ark.: Auto pick-up dangers advertised, 532.	Power, 292, 1081. Program, 1001.
May 5 721 to 760	-Little Rock, Ark.: Auto pick-up dangers advertised, 532.	Purchases and stores, *629, 868, Rail corrugation, 827.
May 12 761 to 796	Nowspaper advertising Comments on 568.	Special trackwork, 827. Way and structures, 248, 827; Comments
May 19 797 to 844	—Philadelphia, Pa., Safety campaign advertising, *896; Comments on, 886. —Pittsburgh, Pa., Advertising literature, De-	on, 847. Wood preservation, 827. —Committee appointments, 250.
May 26 845 to 884	tails, *539.	Engineering proceedings published, 589. Engineering standards, Voting methods, 25. Rules for committees distributed, 629.
June 2 885 to 926	tails, *539. —Place in American business progress [Mc-Graw], 269. —Portland, Ore., Folders, 873. —Public utilities advertising contest, 671. Divibile Color Methods Details *9.31	
June 9 927 to 968	-Public utilities advertising contest, 671Pueblo, Colo., Methods, Details, *231Richmond, Va.;	American Electric Rallway Transportation & Traffic Association: —Committee activities:
June 16	Award for, 332.	Traffic and safety, 706. —Committee appointments, 250.
June 30	Stock sale advertised. *404. —Salt Lake City freight service advertised [Needham], *196.	American Engineering Standards Committee: —Mathematical symbols standardized, 669.
June 00	-Utilities Advertising Association to study stockholder contact, 329.	—Preferred numbers proposed, 589. —Rules of procedure changed, 744.
•	—Youngstown, Ohio, Utility service advertised, 298.	American Institute of Electrical Engineers: —Regional meeting, Plans for, 629.
Accident claim department:	Africa: —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes:	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509.
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193.	—Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416.	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.:
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings,	Buses installed in Beira, 416. Electrification in Natal, South Africa, 416. Airplanes: Chicago, Ill., Airport service, 1007. Cleveland, Ohio: Rail-air service connections established, 914. Detroit, Mich., Railway cooperation with,	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.:
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322.	Buses installed in Beira, 416. Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082.	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963.
Accident claim department: —Anderson, Ind. Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Abrplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich., Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. 	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868.
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Biliboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915.	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich., Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Obio Power & Light Co.: Bus line purchased, 136. 	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385.
Accident claim department: —Anderson, Ind. Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments	 Buses installed in Beira, 416. Electrification in Natal, South Africa, 416. Airplanes: Chicago, Ill., Airport service, 1007. Cleveland, Ohio: Rail-air service connections established, 914. Detroit, Mich., Railway cooperation with, 836. Louisville, Ky., Services planned, 1082. New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. 	American Railway Association: —Automotive conference, Report, 1978. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. EI Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247.
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *329. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago ne-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohic: Bus operators record, 559.	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich., Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 513. Financial report, 716. 	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193.
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident preventien: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety pro-	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio; Rail-air service connections established, 914. —Detroit, Mich., Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.; Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 513. Financial report, 716. Alabama Power Co. (See Birmingham, Ala.) 	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway property:
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago ne-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253.	—Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio; Rail-air service connections established, 914. —Detroit, Mich., Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 513. Financtal report, 716. Personnel changes, 920. Alabama Power Co. (See Birmingham, Ala.) Albany, N. Y: —Capitol District Transportation Co.:	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced,
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886, Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1019, —Grade crossing elimination, New York City, 631.	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich., Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 513. Financial report, 716. Personnel changes, 920. Alabama Power Co. (See Birmingham, Ala.) Albany, N. Y.: —Capitol District Transportation Co.: Financial report, 639. —United Traction Co.: Financial report, 639. 	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Andersen, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Gloversville, N. Y., Right-of-way appraisal
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886, Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1019, —Grade crossing elimination, New York City, 631.	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes:	American Railway Association: —Automotive conference, Report, 1978. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. EI Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmigton, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Gloversville, N. Y., Right-of-way appraisal 680. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased,
Accident claim department: —Anderson, Ind., Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1010. —Grade crossing elimination, New York City, 631. —Jamaica, Accident prevention work, 94. —Kansas City, Mo., Record, *490. —Little Rock, Ark., Campaign, 514, *724. —Long Island R.R., Grade crossing elimination, 682. —New York cars equipped with safety devices, 1095.	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes:	American Railway Association: —Automotive conference, Report, 1978. —Engineering convention Report, 509. Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Gloversville, N. Y., Right-of-way appraisal 680.
Accident claim department: —Anderson, Ind Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *329. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago ne-parking ordinance decreases accidents, 915. —Chicago surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Cousultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1010, 631. —Jamaica, Accident prevention work, 94. —Kansas City, Mo., Record, *490. —Little Rock, Ark., Campaign, 514, *724. —Long Island R.R., Grade crossing elimination, 682. —New York cars equipped with safety devices, 1095. —Philadelphia, Pa.; Safety drive, Details, *896; Comments on, 886.	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes:	American Railway Association: —Automotive conference, Report, 1978. —Engineering convention Report, 509. Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Gloversville, N. Y., Right-of-way appraisal 680. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis., Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018.
Accident claim department: -Anderson, Ind. Accident claims, 418. -El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) -Ailentown, Pa., Billboards carry warnings, *774. -Brady Memorial presentation, Details, *193, *322. -Brooklyn, N. Y., Witness card tells of bonus plan, *543. -Chicago no-parking ordinance decreases accidents, 915. -Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. -Employees' trophy award, *917. -Cleveland, Ohio: -Bus operators record, 559. -Personnel department work, *767. -Consultant on electric railway safety proposed by National Safety Council, 253. -Gary, Ind., Record, Comments on, 1019. -Grade crossing elimination, New York City, 631. -Jamaica, Accident prevention work, 94. -Kansas City, Mo., Record, *490. -Little Rock, Ark., Campaign, 514, *724. -Long Island R.R., Grade crossing elimination, 682. -New York cars equipped with safety devices, 1095. -Philadelphia, Pa.: Safety drive, Details, *896; Comments on, 886. Safety record, 335. -Providence, R. I., Accident record, 332. -Providence, R. I., Accident record, 332.	 —Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes:	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1928 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Gloversville, N. Y., Right-of-way appraisal 680. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis., Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018. —St. Louis & O'Fallon R.R., Casc appealed, 674. —St. Louis, Mo., Valuation hearings, 380; Decision, 1082; Comments on, 1058. —St. Paul, Minn., Valuation fixed, 219, —Tacoma, Wash, Revaluation proposed, 138,
Accident claim department: -Anderson, Ind Accident claims, 418. -El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) -Ailentown, Pa., Billboards carry warnings, *774. -Brady Memorial presentation, Details, *193, *322. -Brooklyn, N. Y., Witness card tells of bonus plan, *543. -Chicago no-parking ordinance decreases accidents, 915. -Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. -Employees' trophy award, *917. -Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. -Consultant on electric railway safety proposed by National Safety Council, 253. -Gary, Ind., Record, Comments on, 1019. -Grade crossing elimination, New York City, 631. -Jamaica, Accident prevention work, 94. -Kansas City, Mo., Record, *490. -Little Rock, Ark., Campaign, 514, *724. -Long Island R.R., Grade crossing elimination, 682. -New York cars equipped with safety devices, 1095. -Philadelphia, Pa.; Safety drive, Details, *896; Comments on, 886. Safety record, 335. -Providence, R. I., Accident record, 332. -Providence, R. I., Accident record, 332. -Providence, R. I., Accident record, 332. -Richmond, Va., Red suits for track men,	—Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 512. Financial report, 716. Personnel changes, 920. Albama Power Co. (See Birmingham, Ala.) Albany, N. Y.: —Capitol District Transportation Co.: Financial report, 639. —United Traction Co.: Financial report, 639. —Paving relief bill requested, 133. Allentown, Pa.: —Lehtgh Valley Transit Co.: Billboards used to prevent accidents, *774. Alliance, Ohio: Stark Electric Ry.: Bus competition curbed, 594. Electrical equipment sold, 258. Financial report, 380. Improvement program, 306. Refinancing plans, 98. University of the program of the progra	American Railway Association: —Automotive conference, Report, 1978. —Engineering convention Report, 509. Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Gloversville, N. Y., Right-of-way appraisal 680. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis., Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018.
Accident claim department: —Anderson, Ind Accident claims, 418. —El Paso, Texas, Details, *193. Accident preventien: (See also Safety Work.) —Ailentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *329. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1010, 631. —Jamaica, Accident prevention work, 94. —Kansas City, Mo., Record, *490. —Little Rock, Ark., Campaign, 514, *724. —Long Island R.R., Grade crossing elimination, 682. —New York cars equipped with safety devices, 1095. —Philadelphia, Pa.: Safety drive, Details, *896; Comments on, 886. —Safety record, 335. —Providence, R. I., Accident record, 332. —PR.R. geometrical poster, *728. —Richmond, Va., Red suits for track men, 297. —Rochester, N. Y., Safety contest winner, 918. —Sait Lake City, Utah, Contest, 373; Winners, *671. —Youngstown, Ohio, Contest, 375.	Buses installed in Beira, 416 Electrification in Natal, South Africa, 416. Airplanes: Chicago, Ill., Airport service, 1007 Cleveland, Ohio: Rail-air service connections established, 914 Detroit, Mich Railway cooperation with, 836 Louisville, Ky., Services planned, 1082 New York-Los Angeles train-airplane service, Comments on, 845 Akron, Ohio: Northern Ohio Power & Light Co.: Bus line purchased, 136 Bus service increased, 375, 516 Canton abandonment sought, 219 Detroit-Pittsburgh bus service, 516 Fare increase, 131, 512 Financial report, 716 Personnel changes, 920 Albany, N. Y.: Capitol District Transportation Co.: Financial report, 639 United Traction Co.: Financial report, 639 Paving relief bill requested, 133 Allentown, Pa.: Lehigh Valley Transit Co.: Billboards used to prevent accidents, *774 Alliance, Ohio: Stark Electric Ry.: Bus competition curbed, 594 Electrical equipment sold, 258 Financial report, 380 Improvement program, 306 Refinancing plans, 98 Weekly pass increases business, 174, 872 Altoona & Logan Valley Electric Ry.: Modernization program, Details, *498 American Electric Railway Accountants' Association:	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N, Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis., Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018. —St. Louis & O'Fallon R.R., Casc appealed, 674. —St. Louis & O'Fallon R.R., Casc appealed, 674. —St. Louis & O'Fallon R.R., Casc appealed, 674. —St. Louis, Mo., Valuation proposed, 138. —Tientsin, China, Valuation proposed, 138. —Tientsin, China, Valuation problem, [Kung], 612. —Washington, D. C., Survey, 1050. Arkunsus Power & Light Co. (See Little Rock, Ark.)
Accident claim department: —Anderson, Ind Accident claims, 418. —El Paso, Texas, Details, *193. Accident preventien: (See also Safety Work.) —Ailentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *329. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1010. —Grade crossing elimination, New York City, 631. —Jamaica, Accident prevention work, 94. —Kansas City, Mo., Record, *490. —Little Rock, Ark., Campaign, 514, *724. —Long Island R.R., Grade crossing elimination, 682. —New York cars equipped with safety devices, 1095. —Philadelphia, Pa.: Safety drive, Details, *896; Comments on, 886. Safety record, 335. —Providence, R. I., Accident record, 332. —PR.R. geometrical poster, *728. —Richmond, Va., Red suits for track men, 297. —Rochester, N. Y., Safety contest winner, 918. —Salt Lake City, Utah, Contest, 373; Winners, *671. —Voungstown, Ohio, Contest, 375. Accidents (Including wrecks): —Ambulance chasers, Comments on, 308.	—Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 513. Financial report, 716. Personnel changes, 920. Alabama Power Co. (See Birmingham, Ala.) Albany, N. Y.: —Capitol District Transportation Co.: Financial report, 639. —United Traction Co.: Financial report, 639. —Vunited Traction Co.: Billboards used to prevent accidents, *774. Alliance, Ohio: Stark Electric Ry.: Bus competition curbed, 594. Electrical equipment sold, 258. Financial report, 380. Improvement program, 306. Refinancing plans, 98. Weekly pass increases business, 174, 872. Altoona, Pa.: —Altoona & Logan Valley Electric Ry.: Modernization program, Details, *498. American Electric Railway Accountants' Association: —Committee activities: Stores accounting, *629, 868. —Committee appointments, 249.	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1928 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis., Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018. —St. Louis & O'Fallon R.R., Case appealed, 674. —St. Louis
Accident claim department: —Anderson, Ind Accident claims, 418. —El Paso, Texas, Details, *193. Accident preventien: (See also Safety Work.) —Ailentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *329. —Brooklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1019. —Grade crossing elimination, New York City, 631. Jamaica, Accident prevention work, 94. —Kansas City, Mo., Record, *490. —Little Rock, Ark, Campaign, 514, *724. —Long Island R.R., Grade crossing elimination, 682. —New York cars equipped with safety devices, 1095. —Philadelphia, Pa.: Safety drive, Details, *896; Comments on, 886. Safety record, 335. —Providence, R. I., Accident record, 332. —PR.R. geometrical poster, *728. —Richmond, Va., Red suits for track men, 297. —Rochester, N. Y., Safety contest winner, 918. —Salt Lake City, Utah, Contest, 373; Winners, *671. —Youngstown, Ohio, Contest, 375. Accidents (Including wrecks): —Ambulance chasers, Comments on, 308, —Brakes affect on [Fitch], 247. —Fithian, 111, 958.	—Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton shandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 512. Financial report, 716. Personnel changes, 920. Alabama Power Co. (See Birmingham, Ala.) Albany, N. Y.: —Capitol District Transportation Co.: Financial report, 639. —United Traction Co.: Financial report, 639. —Vaving relief bill requested, 133. Allentown, Pa.: —Lehigh Valley Transit Co.: Billboards used to prevent accidents, *774. Alliance, Ohio: Stark Electric Ry.: Bus competition curbed, 594. Electrical equipment sold, 258. Financial report, 380. Improvement program, 306. Refinancing plans, 98. Weekly pass increases business, 174, 872. Altoona, Pa.: —Altoona & Logan Valley Electric Ry.: Modernization program, Details, *498. American Electric Railway Association: —Committee activities: Stores accounting, *629, 868. —Committee appointments, 249. American Electric Railway Association: —Advertising section distributes posters, *208.	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Andersen, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis, Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018. —St. Louis & O'Fallon R.R., Casc appealed, 674. —Tacoma, Wash., Revaluation proposed, 138, —Tientsiu, China, Valuation problem, [Kung], 612. —Washington, D. C., Survey, 1050. Arkunsns Power & Light Co. (See Little Rock, Ark.) Asbury Park, N. J: —Coast Cities Ry.: Bus substitution, 919. Associated Business Papers, Inc.: —National award to Electric Railway Journal,
Accident claim department: -Anderson, Ind Accident claims, 418. -El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) -Ailentown, Pa., Billboards carry warnings, *774. -Brady Memorial presentation, Details, *193, *322. -Brooklyn, N. Y., Witness card tells of bonus plan, *543. -Chicago ne-parking ordinance decreases accidents, 915. -Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' troophy award, *917. -Cleveland, Ohio: Bus operators record, 559. Personnel depariment work, *767. -Consultant on electric railway safety proposed by National Safety Council, 253. -Gary, Ind., Record, Comments on, 1019, 631. -Jamaica, Accident prevention work, 94. -Kansas City, Mo., Record, *490. -Little Rock, Ark., Campaign, 514, *724. -Long Island R.R., Grade crossing elimination, 682. -New York cars equipped with safety devices, 1095. -Philadelphia, Pa.: Safety drive, Details, *896; Comments on, 886, Safety record, 335. -Providence, R. I., Accident record, 332. -P.R.R., geometrical poster, *728. -Richmond, Va., Red suits for track men, 297. -Rochester, N. Y., Safety contest winner, 918. -Sait Lake City, Utah, Contest, 373; Winners, *671. -Youngstown, Ohio, Contest, 375. Accidents (Including wrecks): -Ambulance chasers, Comments on, 308, Brakes affect on [Fitch], 247. -Fithian, Ill., 988. -Long Island R.R., 556. -Oakland, Cal., Ferry accident, 333; Decision, 515, 707.	—Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio: Rail-air service connections established, 914. —Detroit, Mich Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 512. Financial report, 716. Personnel changes, 920. Alabama Power Co. (See Birmingham, Ala.) Albany, N. Y.: —Capitol District Transportation Co.: Financial report, 639. —United Traction Co.: Financial report, 639. —Vaving relief bill requested, 133. Allentown, Pa.: —Lehigh Valley Transit Co.: Bilboards used to prevent accidents, *774. Alliance, Ohio: Stark Electric Ry.: Bus competition curbed, 594. Electrical equipment sold, 258. Financial report, 380. Improvement program, 306. Refinancing plans, 98. Weekly pass increases business, 174, 872. Altoona, Pa.: —Altoona & Logan Valley Electric Ry.: Modernization program, Details, *498. American Electric Railway Accountants' Association: —Committee activities; Stores accounting, *629, 868. —Committee appointments, 249. American Electric Railway Association: —Advertising section distributes posters, *208. —Annual convention: Executive committee resolutions, 223. Exhibitographs, 343, 485, 683, 759, 925, 1095.	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 963. Anthony N. Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1928 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. Medal awards for 1926, 129, 247. —Presentations made, Details, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis., Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018. —St. Louis & O'Fallon R.R., Case appealed, 674. —St. Louis
Accident claim department: —Anderson, Ind Accident claims, 418. —El Paso, Texas, Details, *193. Accident prevention: (See also Safety Work.) —Allentown, Pa., Billboards carry warnings, *774. —Brady Memorial presentation, Details, *193, *322. —Brocklyn, N. Y., Witness card tells of bonus plan, *543. —Chicago no-parking ordinance decreases accidents, 915. —Chicago Surface Lines: Accident record, Details, 869; Comments on, 886. Employees' trophy award, *917. —Cleveland, Ohio: Bus operators record, 559. Personnel department work, *767. —Consultant on electric railway safety proposed by National Safety Council, 253. —Gary, Ind., Record, Comments on, 1019. —Grade crossing elimination, New York City, 631. —Jamaica, Accident prevention work, 94. —Kansas City, Mo., Record, *490. —Little Rock, Ark., Campaign, 514, *724. —Long Island R.R., Grade crossing elimination, 632. —New York cars equipped with safety devices, 1095. —Philadelphia, Pa.: Safety drive, Details, *896; Comments on, 886. Satety record, 335. —Providence, R. I., Accident record, 332. —P.R. geometrical poster, *728. —Richmond, Va., Red suits for track men, 297. —Rochester, N. Y., Safety contest winner, 918. —Sait Lake City Utah, Contest, 373; Winners, *671. —Youngstown, Ohio, Contest, 375. Accidents (Including wrecks): —Ambulance chasers, Comments on, 308, —Brakes affect on [Fitch], 247. —Fithian, Ill., 938. —Hamburg, Germany, Anti-climber prevents damage [Mattersdorf], *933. —Long Island R.R., 556. —Oakland, Cal., Ferry accident, 333; Decision,	—Buses installed in Beira, 416. —Electrification in Natal, South Africa, 416. Airplanes: —Chicago, Ill., Airport service, 1007. —Cleveland, Ohio; Rail-air service connections established, 914. —Detroit, Mich Railway cooperation with, 836. —Louisville, Ky., Services planned, 1082. —New York-Los Angeles train-airplane service, Comments on, 845. Akron, Ohio: —Northern Ohio Power & Light Co.: Bus line purchased, 136. Bus service increased, 375, 516. Canton abandonment sought, 219. Detroit-Pittsburgh bus service, 516. Fare increase, 131, 513. Financial report, 716. Personnel changes, 920. Alabama Power Co. (See Birmingham, Ala.) Albany, N. Y.: —Capitol District Transportation Co.: Financial report, 639. —United Traction Co.: Financial report, 639. —Vaving relief bill requested, 133. Allentown, Pa.: —Lehigh Valley Transit Co.; Billboards used to prevent accidents, *774. Alliance, Ohio: Stark Electric Ry.: Bus competition curbed, 594. Electrical equipment sold, 258. Financial report, 380. Improvement program, 306. Refinancing plans, 98. Weekly pass increases business, 174, 872. Altoona & Logan Valley Electric Ry.: Modernization program, Details, *498. American Electric Railway Accountants' Association: —Committee activities; Stores accounting, *629, 868. —Committee activities; Stores accounting, *629, 868. —Committee activities; Stores accounting, *629, 868. —Annual convention: Executive committee resolutions, 223. Exhibitographs, 343, 485, 683, 759, 925,	American Railway Association: —Automotive conference, Report, 1078. —Engineering convention Report, 509. —Motor Transport Division organized, 30; Comments on, 25. Anderson, Ind.: —Union Traction Co.: Accident claims, 420. Bus controversy, Muncie, 375, 837, 918, Financial report, 363. Anthony N, Brady safety award: —Award for 1927 authorized, 868. —Dinner to 1926 prize winners, *374; Comments on, 385. —El Paso, Tex. awarded 1926 safety prize, *193. —Medal awards for 1926, 129, 247. —Presentations made, Detalis, *322. —Wilmington, N. C., Safety methods win award, Details, 233. Appraisal of railway properly: —Baltimore, Md., Easements Valuation, 218, 257, 331. —Delaware & Hudson railway stock reduced, 880. —Indiana, Appraisal expenditures ruling, 632. —Indianapolis, Ind., Bus valuation increased, 880. —Madison, Wis., Valuation, 252, 557. —Philadelphia, Pa., Underlying companies valuation sought, 1010, 1050; Comments on, 1018. —St. Louis & O'Fallon R.R., Casc appealed, 674. —St. Louis & O'Fallon R.R., Casc appealed, 674. —St. Louis & O'Fallon R.R., Casc appealed, 674. —St. Louis, Mo., Valuation proposed, 138. —Tacoma, Wash., Revaluation proposed, 138. —Tacoma, Wash., Revaluation proposed, 138. —Tacoma, Wash., Revaluation problem, [Kung], 612. —Washington, D. C., Survey, 1050. Arkansan Power & Light Co. (See Little Rock, Ark.) Asbury Park, N. J.: —Coast Cities Ry.: Bus substitution, 919. Associated Business Papers, Inc.: —National award to Electric Railway Journal, 265.

Atlanta. Ga.:

Georgia Power Co.;

Bringing out and Jastening motor leads [Equipment Department], *124.

Budget for 1928, 383.
Curtailment of bus service opposed, 417.

Equipment maintenance methods, 804.
Field testing machine, Portable, *241.
Financial report, 920.
Group insurance for employees, 255.
Increase sought in Rome, 917, 958, 1048.

Maintenance costs reduced by new equipment [McAloney], *984; Comments on, 971. Management policy; Comments on, I.
Personnel changes, 422.
Rearrangement of stops asked, 412.
School ticket sale rearranged, 479.
Single-deck buses reduce costs, *324; Comments on, 309.
Stores co-operate with Details, *400.
Tickets sold with bread wrappers, 134.
Track construction, Concrete beam method, *114.

*114.

Training employees by individual instruction. *361.

Veterans awarded emblems, 334.

Wage increase, 214.

Wood tie track construction, Details [Smith], *439.

Atlantic City, N. J.:

—Atlantic City & Shore R.R.:

Car painting methods, Details, *978.

Feeder bus service, Details, *577.

Vacuum cleaner for car seats, 545.

Augusta, Gn.:
—Augusta-Aiken Railway & Electric Corporation: Advertising prize awarded, 710,

Aurora, 1ll.:

-Chicago, Aurora & Elgin R.R.: Track and terminal work planned, 305.

Australia:

--Melbourne:
Car decorated with electricity for parade,
*355.

Sydney, N. S. W.: Automatic switch for reversing trains, 728 Engineer studies railway practices in Europe and United States, 222. Financial report, 135.

Austria:
—Electrification plans abandoned, 493, 593.

Automobiles:
—Operating cost [Jordan], *319.
—Passenger, Registrations, 1917-27, *42.

B

Baltimore, Md.:

—Traffic study to be made, 414.

—United Railways & Electric Co.:

Bus competition threatened, 914.

Car color scheme adopted, 464.

Coal ordered for employees, Saving, 1034.

Easements, valuation, 218, 257, 331; Comments on, 309.

Fare controversy, 211, 477, 557, 591, 673, 831, 1046.

Fare increase, Details, 293, 331; Comments on, 267, 300.

Financial report, 258, 521, 713.

Information service established, 96.

Keeping coal wagons off car tracks, 736.

Parking law in Chicago studied, 134.

Power property purchased, 878.

Progress parade, *954.

Reciprocating grinder car, *1037.

Red Cross aid offered, 412.

Rerouting plan discussed, 632.

Stock reclassification to be made, 521.

Street car directories distributed, 254.

Street guide issued, 371.

Wages increased, 335.

Bamberger Electric Ry. (See Salt Lake City, Utah).

Bearings: Baltimore, Md.:

Bearings:

—Bearings discussed by C.E.R.M.M.A., 202.

—Roller, Trial, Green Bay, Wis., 643.

Beaumont, Texas:

Deaumont, Texas:

--Eastern Texas Electric Co.:

Brake valve lubrication [Pressler]. *476.

Bushing for brake hangers [Pressler].

*325.

Car purchase planned for Port Arthur, 184.

New franchise in Port Arthur, 584.

Beaver Valley Traction Co. (See New Brighton, Pa.)

Benton Harbor, Mich.;
—Benton Harbor-St. Joseph Railway & Light Co.: Sale proposed, 560.

Southern Michigan Ry.: Receiver appointed, 302. Berlin, Germany (See Germany).

Berlin, N. 11.:

—Berlin Street Ry.:

Track reconstruction methods [Noyes],

273.

Biddeford, Mr.:

-Biddeford & Saco Ry.:
Fare situation and public relations, 1005.
Line abandoned, 1050.
Patrons ask fare increase, 130.

Binghamton, N. Y.:
-Binghamton Ry.:
Armature jack, Hydraulic. *365.
Armature acks, *408, *776.
Armature winding stand, *585.

namon, N. 1.;—Dinghamon Ay. (contended):
Bus line purchased, 788,
Dipping tank, Portable, *406.
Forcelosure, 99, 560.
Gas furnace, *992.
Hydraulic press constructed, *506.
Reorganization plans, 716, 922.
Safety lights in shop, *586.
Sling for dipping armatures, *326.
Tool and material rack, Portable, *626.
Trolley pole rack, *739.
Truck for moving armatures, *702.
Ventilated welding rod holder, *366.

Birmlngham, Ala.:
—Alabama Power Co.:
Freight locomotive, *735,
—Birmingham Electric Co.:
Clamp for welding rail joints.
Journal box wear increased by chilling,
*585.

Service advertised, Details, Coffin brief, *15; Comments on, 3.
Testing car axles [Taurman], *122.

Blanks and forms:

—Car wheel records, Omaha, Neb., *816.

—Iospection cards, Los Angeles, Cal. [Jordan].

*359.

—Witness card for accidents, Brooklyn, N. Y.,

*543.

Bok Award (See Harvard Advertising Award).

Bok Award (See Harvard Advertising Award).
Book reviews:
—Accident facts, 1928, by National Safety
Council, 965.
—Aladdin, U. S. A., by Ernest Greenwood, 792.
—American Electric Railway Association proceedings for 1927, 792.
—American universities and colleges, by David
Allan Robertson, 420.
—Bills of lading, by Ernest W. Hotchkiss, 792.
—Business, the civilizer, by Earnest Elmo Calkins, 965.
—Car builders' cyclopedia, by Simmons-Boardman Publishing Co., 640.
—Die Elektrifizierten Haupthinien der Schweize-

man Publishing Co., 640.

Die Elektrifizierten Haupthinien der Schweizerischen Bundesbahnen, by J. Göttler. 100.

Deutscher reichsbahn—kalender for 1928, by German State Ry., 100.

Electrical power transmission—principles of design and performance, by E. A. Loew, 100.

Electric control gear and industrial electrification, by William Wilson, 260.

Electric traction on Italian Railways, 792.

Elektrische Vollbahnlokomotiven, by Dr. Karl Sachs, 965.

Employee magazines in the United States, by National Industrial Conference Board, 100.

Eogineering of power plaats, by R. H. Fernald and G. A. Orrok, 100.

Facts and figures of the automobile industry—1928 edition, by N.A.C., 965.

Financial and business forecasting, by Dr. Warren F. Hickernell, 965.

—500 representative public utility advertise-

Warren F, Hickernell, 965.

-500 representative public utility advertisements, by Public Utilities Advertising Association, 792.

-Five thousand sheet steel products and who makes them, by Sheet Steel Trade Extension Committee, 260.

-Heinrich Bussing und sein werk, by Automobilwerke, 260.

-Industry's coming of age, by Rexford Guy Tugwell, 420.

Iugweii, 420.

—In retrospect, 260.

—Mundy's earning power of railroads, 100.

—National electric safety code, by Department of Commerce, 640.

—Storage batteries, by Morton Arendt, 965.

—The behavior of prices, by Frederick C. Mills, 640.

-The Port of New York Authority, 420. -The principles of bond investment, by Law-rence Chamberlin and George W. Edwards, 100.

The road to plenty, by William Trufant Foster and Waddill Catchings, 640.
 Trade association activities, by Dept. of Commerce, 260.

-Transactions of the National Safety Council, 100.

-Transit and transportation, by H. M. Lewls, 792.

-Universal directory of railway officials, 1928, by Directory Publishing Co., 965.

Utilities Commissioners Association, by National Association of Railroad and Utilities Commissioners, 640.
 Water power bonds—1927 edition, 100.
 Where shall they park, by National Safety Council, 420.

Boston & Maine R.R.:
—Power contracts, 514.

Boston, Mass.:

Boston Elevated Ry.:

Brighton rejects bus operating proposal, 594.

Capital stock tax suit lost. 483.
Financial reports, 562, 791.
Governor insists on legislation for, 835, 1006, 1084.

Grease iron for brake drums [MacKay], *662.

Maintenance code. 460.

*682.

Maintenance code, 460.

Man power saving in track construction,
Comments on, 797.

New cars delivered, *643.

Public control and reorganization recommended, 26; Comments on, 1,
Public control legislation. Progress, 95,
171, 211, 293, 515, 556, 592, 709, 784.

Binghamton, N. Y.:—Binghamton Ry. (Continued):

Bus line purchased, 788,
Dipping tank, Portable, *406.

Boston, Mass.:—Boston Elevated Ry. (Continued):

Snow removal equipment and methods,

Snow removal equipment and methods, *737.

Stockholders meeting, 596.
Supervisors' Association by-laws, 254.
Wooden cars retired, 869.

—Eastern Massachusetts Street Ry.:
Bus, permit sought, 789.
Dividend earnings, 680.
Fare reduction in Melrose, 834.
Financial report, 259, 636.
Public control bill, 477, 783, 954.
Wage negotiations, 590.

—Traffic survey, Report, 832.
Boston, Revere Beach & Lynn R.R.:
—Electrification costs, Estimate of, 183.
—Electrification plans, 842.

Brady Safety Award (See Anthony N. Brady safety award).

Brakes and compressors:

safety award).

Brakes and compressors:

Air-magnetic brake tests, Cincinnsti, Ohio,

*423, 926.

Air vs. electric brakes, Europe, *947.

Brakes, Effect on schedules, speeds and
accidents [Fitch], 247; Comments on, 227.

Dynamic braking and heating, Joliet, Ill.

[Baumgarten], *648; Analysis [Wheeler],
c905, c1074; [Baumgarten], c906; Comments on, 645.

Pittsburgh, Pa. Experimental cars [Gordon],
*888; Comments on, 885.

Progress in band brake design *[McWhorter],
248.

Brazil:
—Paulista Ry., Electric locomotives, Design,

-Paulines 682.
-Portable substation. 842.
-Public utilities sold, 922.
-Railway service in cities [Floyd], *1073.

-Railway service in cities [Floyd], *1073.

Bridges:
-El Paso, Texas to Juarez, Mexico, Plans for,
485.
-Harrisburg, Pa., Sale negotiations, 922.
-New York City, Flushing bridge, *173,
-Omaha, Neb., Reconstruction controversy,
133, 592.
-Portland, Maine, Steel bridge, Details, 403.
-St. Louis, Mo., McKinley bridge, Plans for
approach, 1006.

British Columbia Electric Co. (See Vancouver, B. C.)

British West Indice:

Jamaica Public Service Co.:

Accident prevention work, 94.

Grease lubrication for trolley

[Brsmmer]. *281.

Brooklyn City R.R. (See New York City). Brooklyn-Manhattan Transit Corporation (See New York City).

Buffalo & Erie Ry. (See Erie, Pa.):

Buffalo & Eric Ry. (See Eric, Pa.):
Buffalo, N. Y.:

—International Ry.:
Bus permit granted. 338, 950.
Capital stock changed. 636.
Community development campaign. 835.
Co-ordinated service proposed. 749.
Eric R.R. seeks purchase of high-speed line. 138.
Financial reports, 599, 880.
Financial recorganization, 302, 377; Comments on, 345.
Ohmer fare registers installed, 485.
Personnel changes, 563.
Transfers, Forms in use. Details [Snow], *364.
Tokens distributed as Christmas gifts. 298.
Business ethirs. Progress of. Rockfeller's re-

Business ethirs. Progress of Rockfeller's remarks, Comments on, 266.

California, State of:
—Tax system protested, 521.

Canadian Electric Railway Association:
—Annual meeting, Program, 744; Report, 993.

Lack of progress in methods [Savsgel, 1042, New Brighton, Pa., Machine for, *126, Washing machines for, Europe, *111.

—New Brighton. Pa., Machine for. *126.

—Washing machines for, Europe, *111.

Car design:
—Articulated car. Details [Clardy], *17.

—Atlanta, Ga., Demonstration car for employee training. *361.

—Atlanta, Ga., New contingent reduces maintenance costs, Details [McAloney], *084; Comments on, 971.

—Car specifications (Including orders);

Boston Elevated Rv., *643.
Cincinnati, Ohio, 824, *1015.
Cleveland. Ohio, 263, 883.
Detroit, Mich., *485, *682.

Evansville, Ind., 142.
Fairmont, W. Va., 1095.
Fitchburg, Mass., *843.
Highwood, Ill., *1055.
Interstate Public Service Co., *321.
Knoxville, Tenn., *343.
Macon, Ga., *525.
Mexico City, Mexico, *602, *795.
Milwankec, Wis., 142.
Minneapolis, Minn., *565, 883.
New Brighton, Pa., *102.
New Orleans, La., *263.
New York Ranid Transit Co., Details, *37.
New York, Westchester & Boston Ry., *683.
Purchases in 1927 analyzed, Statistics, *56: Comments on, 41.
Scranton, Pa., 796.
Seattle Municipal Rv., 883.
Wasbington, D. C., 143, *759.

January-June, 1928] Car design (Continued):

—Developments discussed by Southwestern Association, 777.

—Effect on track costs, Comments on, 647.

—Gas-electric;

Developments in design [Stinemetz], *575.

Europe, Discussion of, *947.

—Germany, For high-speed line, Details [Breslauer], *501.

—Glasgow, Scotland, Donble-trnck, *398.

—Green Bay, Wis., Remodeled cars, Details [Bodoh], *275.

—Improvements and progress in [Hermann], 997.

—Holland, New type, Details, 323. Chattanooga. Tenn.:
—Chattanongs Traction Co,:
Bus substitution, 376. Tennessee Electric Power Co.: Bus service installed, 299. Financial report, 1012. Chleago, Aurora & Elgin R.R.; (See Aurora, III.): Chicago, Aurora & Elgin R.R.: (See Aurora, III.):
Chicago, Aurora & Elgin R.R.: (See Aurora, III.):
—Bus terminal plans, 675.
—Central Public Service Corporation:
—Charter amendments sought, 1093.
—Chicago City Ry.:
—Interest payment, 138.
—Chicago Motor Coach Co.:
—Bus expansion plans, 1089.
—Chicago Railways:
—Foreclosure proceedings, 258, 481.
—Franchise payment made to city, 598.
—Interest on bonds ordered, 179.
—Chicago Rapid Transit Co.:
—Car operating record, 112.
—Employees accident record, 954.
—Fare hearings, 296, 557, 872, 1046.
—Financial report, 377.
—Pass abolition hearings, 748.
—Service improvements, 642.
—Taxes doubled in eight years, 856.
—Terminal construction, 720, 968.
—Wage arbitration agreement, 173.
—Chicago Surface Lines:
—Accident record, Details, 869; Award, *917; Comments on, 886.
—Bus service extended, 216, 480, 837.
—Car failure record, 1927, 350.
—Electric lamps changed, 543.
—Financial reports, 257, 518; Comments on, 528.
—German visitor's comments on, 95.
—Jigs and dies for shop use, Details, *271.
—Payments to city, 679.
—Punch-forms switch iron handles, 209.
—Safety movies, 862.
—Sight-seeing and route guide issued, 336.
—Traffic during Christmas shopping season, *29.
—Wage arbitration, 91, 173.
—Commuter transit time survey, 391.
—Electrification reduces smoke pollution, 576.
—Wirst aid training, 738. 997.

-Holland, New type, Details, 323.

-Home construction, Comments on, 226.

-Kansas City, Mo., Rebuilt cars, Details, *490.

-Lanarkshire, Scotland, Double deck [Moller], *494.

-Leavenworth, Kans., Interurban cars, Details, *355.

-Little Rock, Ark., *724.

-London, England, Subway car, *738; Orders, 1087.

Milwaylene, Wis, Details, [Corden], *310. -Milwaukee, Wis., Details [Gordon], *310, *351; Comments on, 307. -New Orleans, La., Instruction car for train-men [Murphy], *401. -New York, Westchester & Boston, Details [Smith], *235. One-man:
 Europe, Details [de Ribes], *704; [Bacquerisse], *911; Comments on, 887.
Kansas City, Mo., Rebuilt. *490.
Osaka, Japan, New cars, *719.
Osgood Bradley sample car, Details, *1020; Comments on, 1018. -One-man: Osgood Bradley sample car, Details, *1020; Comments on. 1018.

—Parsllel vs. radial axle cars [Castaing], 860.
—Peter Witt de luxe double-deck car, 263,
—Pittsburgh, Pa., Experimental cars, Details [Gordon], *888; Comments on, 885.
—Princeton, W. Vs., *579.
—Pueblo, Colo., Details, *231.
—Radial-axle cars, Europe [Harmel], *857.
—Rio de Janeiro, Brazil, [Floyd], *1073.
—Rochester, N. V., Subway car, *213.
—St. Louis, Mo., Chair car, *855.
—Uruguay, Gas-electric, Bids asked, 565.
—Western Ohio Ry., Rebuilt, *693.
—Winnipeg, Can., Gas-electric car, *543.
—Woodside, N. Y., Sand car, *651.
Carhouses, and *storage yards:
—Delsware, Ohio, Plans for, 486.
—Detroit, Mich., Details, *624.
—Turin, Italy, New carhouse, 400.
—Worcester, Mass., *274; Details, *848; Comments on, 885.

Car orders (See Car design). Wage arbitration, 91, 173.

-Commuter transit time survey, 391.
-Electrification reduces smoke pollution, 576.
-First aid training, 738.
-Himois Power & Light Corporation:
Airport service, 1007.
Bus substitution in Quincy, 417.
Fare increase, Cairo, 132.
Monthly permit system, Peoria, 371.
Peoria fare controversy, 673.
Power equipment transferred from Illinois
Traction, 302.
Preferred stock issue, 717, 838.
Ouincy, Ill., Bus installation, 634.
Refinancing plan, 339, 599.
-Illinois Terminal Corporation: Cars:
—Articulated cars, Uses of, Details [Clardy], *17.

Boston, Mass., Wooden cars retired, 869.

Cleveland, Ohio, Aluminum car effects energy saving, *904.

Controller maintenance, Details [Beers], *465; Comments on, 427.

Dynamic braking and heating, Joliet, III. [Baumgarten], *648; Comments on, 645; Analysis [Wheeler], c905, c1074; [Baumgarten], c906. -Gary, Ind., Cars converted into snow fighting units, 223.

-Gas-electric cars cut costs [Stinemetz], *575.

-Hamilton, Ont., Details [Porter], *1068.

-Los Angeles, Cal., Improvements planned, 1016. 1016.

—Milwaukee, Wis., Dining car, 134.

—Modern equipment discussed by New England Street Railway Club, 550.

Ons-man:

Hartford, Conn., Extensions sought, 747.

Holland, Operation [Nieuwenhuis], 859.

Kansas City, Kans., Installation, 746.

Little Rock, Ark., Results of, Details, Milwaukee, Wis. [Gordon], *351. New York City, Hearings on, 334. --Springfield, Mass., Experimental car, Energy consumption [Harwood], 550.
--Springfield-Worcester, Mass., Old cars burned, *555.

*555.
Central California Traction Co. (See San Francisco, Cal.):
Central Electric Rallway Association:
—Accountants' Association:
Annual meeting, Program, 247.
New officers elected, 330.
Work of, Comments on, 346.
—Annual outing, Program, 999.
—Master Mechanics' Association:
Developments and service requirements discussed, 202.
Inspection rules and uniform charges, Details, *21-24.
Summer meeting, Report, 829.
New groups proposed, 292.
Publicity representative proposed, 292.
—Traffic Association:

-Traffic Association:
Work of, Details, 330.
Winter meeting, Program, 90. Report, 201.
-Year Book issued, 744.
Chamber of Commerce of the United States:
-Annual meeting, Report, 783; Comments on, 761.

Charles A. Coffin prize:

—Birmingham, Ala., Presentation, *15; Comments on, 3,

—Gary Railways enters contest, 707.

Refinancing plan, 339, 599.

-Illinois Terminal Corporation:
Franchise approved, 1086.
Lease of three rallways, 218, 414, 1002.

-Illinois Traction System:
Bus line connections, 177.
Chamoaign line abandoned, 922.
Consolidation of subsidiaries, 745.
Interchanging system, 514.
McKinley Bridge traffic plans, 1006.
Personnel ebanges, 484.
Power equipment transferred, 302.
Terminal improvements, St. Louis, 917.
Wreck, Fithian, III., 958.

-No-parking ordinance decreases accidents, 915.

-Parking ordinance, 27, 92; Results, 172;

No-parking ordinance decreases accidents, 915.
Parking ordinance, 27, 92; Results, 172; IMcIlraith1, *189; 298, 332; [Locke], 548, 621; Comments on, 185.
Railway franchise negotiations, 673.
St. Louis-Chicago bus service arranged, 1090.
Subway construction plans, 478.
Three-level streets urred by engineer, 630.
Traction enabling bill, Special legislative session petitioned, 93, 131.
Traction legislation. Progress, 297, 331, 372, 414, 632, 783, 871, 1986; Comments on, 528.
Traction referendum and hus lines approved by voters, 1906.
Transit program agreed on by Governor and Mayor, 252.
Transit program suggested, 916, 957.
Chicago & Jollet Electric Ry. (See Joliet, III.):

-Transit program suggested, 916, 957.

Chicago & Jollet Electric Ry. (See Jollet, Ill.):
Chicago, North Shore & Milwankee R.R. (See Highwood, Ill.):
Chicago, South Bend & Northern Indiana Ry. (See South Bend, Ind.):
Chicago, South Shore & South Bend R.R. (See Michigan City, Ind.):
Chicago & West Towns Ry. (See Oak Park, Ill.):
China:
-Tientsin railway valuation problem [Kung], 612.

Cincinnati. Hamilton & Dayton Ry. (See Dayton, Ohio):

ton, Onio):

Cincinnati, Ohio:

—Cincinnati Lawrenceburg & Aurora Electric Street R.R.:

Reorganization plan, 378.

—Cincinnati Street Rv.:

Automatic substation system planned, 443.

Beeler traffic report discussed, 135.

Brake valves, Sticking cured [Graubner],

*585.

S85.

*585.

Rus service expanded 300.

Bus unification, 1088.
Cars ordered, 834 * 1015
Coupling bar holders, *506.
Financial report, 560; Comments on, 529.
Foremen's conferences, 616.
Non-paying extension vetoed, 769.
Power distribution system, Details [Swift],
*117. *688.

Prizes for suggestions on selling service,
746.
Rapid transit situation, 478, 1005.

Cincinnati, Ohio:
—Cincinnati Street Ry. (Continued):
Report on extensions, 672.
Trolley tension rod for emergency, *544.
Type of new cars, Conferences on, 183.
Wage agreement renewed, 956.

wage agreement renewed, 956.

-Taxicab companies merged, 959.

-Traffic report discussed, 131.

Clarksville, Tenn.:

-Citizens Ry.:

Bus substitution, Survey of sentiment for, 833.

Cleveland, Ohlo:

—Cleveland Ry.:

Bus fraochise, 875.

Bus operators safety record, 559.

Cars ordered, 263: Details, 883.

Euergy consumption of aluminum car, 904.

Fare increase, 873, 1002.

Fare situation, Details, 670.

Franchise contract, 745; Comments on, 687. Male chorus, 1007.
Personnel department, Details, *767.
Radio program, *633.
Rapid transit system negotiations, 413, 1046.

Surplus tax decision appealed, 219.
Track maintenance [Lavan], *447.
Troiley wire breaks, Analysis [Scott], *278. Wage increase, 784, 872, Zone fare trial suggested, 1948.

-Cleveland, Southwestern Railway & Light Co.: _. Air service connections established. 914.

No-parking ordinance refused, 748.
Subway system proposed, Details, 1083.
Traffic lights aid traffic [Emerson]. 246. Clinton, Davenport & Muscatine Ry. (See Davenport, Iowa):

Coast Cities Ry. (See Asbury Park, N. J.); Coffin prize (See Charles A. Coffin prize); Colombia:
—Medellin railway operation, 874.

Colombia:

—Medellin railway operation, 874.

Colorado Springs, Colo.:

—Colorado Springs & Interurban Ry.:

Outlook for 1928 improves, 301.

Colombia, S. C.:

—Bus service installed, 632.

—Transit situation, 91, 295, 375, 784; Comments on, 346.

Columbus, Delaware & Marion Electric Co.:

Shop construction plants, 486.

Columbus, Delaware & Marion Electric Co.:

Shop construction plans, 486.

Columbus, Delaware & Marion Electric Co.:

Shop construction plans, 486.

Columbus Railway, Power & Light Co.:

Bandits rob employees, 415.

Fare increase needed, 954.

Franchise negotiations, 410, 593.

Ordinance changes schedules, 871, 958.

Personnel changes, 182.

Service improvements, 747.

Skip stop service installed, 632, 1006.

—Freight terminal enlarged, Details, *363.

—Scoto Valley Railway & Power Co.:

Note issue, 378.

Theatre service advertised, *335.

Connecticut, State of:

—Interstate bus tax unheld, 338.

Connecticut, State of:

Connecticut, State of:

—Interstate bus tax upheld, 338.

Conspectus of indexes, 179, 340, 529, 715, 879.

1051; Changes in, 1051.

Havana Central R.R.:
Substations, Automatic, Details [Whitlow],
*348.

Culvert construction, Pittsburgh, Pa. [Sumner], *856.

*856. Cumberland County Power & Light Co. (See Portland, Mc.): Czechosłovakia: —Prague installs trackiess trolley, 415, 642.

 \mathbf{D}

Dallas, Texas:

—Dallas Railway & Terminal Co.:

City supervisors repert on service, 1051.

Courtesy campaign, 298.

Fare increase sought, 91, 480; Comments on, 146.

Power rate charges reduced, 680.

Track construction plans, 795.

Franchise extended, 411. Texas Electric Ry.: Financial report, 715. Freight service installed, 672, 917.

Texas Interurban Ry.: Financial report, 598.

Davenport, Iowa:

—Clinton, Davenport & Muscatine Ry.:
Interurban bus service installed, 919.

—Tri-City Ry.:
Dividend on preferred stock, 563.

Dayton, Ohio:

—Cincinnati, Hamilton & Dayton Ry.:

Fare increase, 1004.

Financial report, 790; Comments on, 763.

—Traffic survey, Report, 831; Details, *1026.

Delaware & Hudson Co.:

—Reorganization pending, 878.

—Value of railway stock reduced, 880.

Delaware Lackawanna & Western R.R.:

Delaware, Lackawanna & Western R.R.:

—Electrification plans, 553, 718; Details, *707;
Comments on, 685.

Comments on, vos.

Denver, Cul.;
—Denver Tramways:
Bonus system for employees, 728.
Bus supplementary service installed, 910.

—Gary Kallways enters contest, 707.

Charlestown, W. Va.:

—Charlestown Interurban R.R.:

Boring journal bearings [Carpenter], *663,

Charlotte, N. C.:

—Pledmont & Northern Ry.:

Extension controversy, 671, 746, 787, 871, 1004, 1047. READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Iliustrated, c Communications.

```
Denver, Col:

—Denver Tramways (Continued):

Dividend rate cut, 380.
Fare suit, 370.
Financial report, 483,
Franchise negotiations, 252, 873.
Oil house, Design, Details [Minister], *658,
Track construction methods, Details
[Lavan], *447.
Transfers simplified, 1004.

Department of Street Rys. (See Detroit, Mich.)

Proc Malage Lovas.
                Des Moines, Iowa:

—Des Moines City Ry.:

Banker takes up preferred stock issue, 180.
Fire insurance cost reduced [Bernd], 583;

Comments on, 569.

Public warned against "endless chain" sale
of weekly pass, 171.
           Problem Warbed against children warbed against able pit light [Williamef, *1036, Airport service, 836; Comments on, 845, Bus bids advertised, 264, Bus bids advertised, 264, Bus line abandoned, 516, Bus survey, Report, 1088, Cross-seats installed in trailers, *900, Departmental reorganization, 414, Express car and local bus operating plan, Details, *4, 172, 334, 358, 479; Comments on, 386, Fare situation, 633, 1044, Financial situation, 1044; Comments on, 1059, Gear lubrication [Williams], *241,
                             Gear lubrication [Williams], *241.
Insurance carried, Report on, 1006.
Labor union contracts opposed, 131.
Leased buses, Controversy, 959.
Management plans outlined by mayor, 132.
Modern carhouse completed, Details, *624.
New cars, Details, *485.
Paving schedule, 174.
Tax relief sought for employees, 920.
Track extension to River Rouge, 673.
Track improvements, Progress, 1095.
-Detroit, Jackson & Chicago Ry.:
Personnel changes, 641.
Receiver appointed, 637.
-Detroit United Ry:
                                Receiver appointed, 637.

-Detroit United Ry.:
New cars, Design, Details, *682.
Reorganization, 754, 759, *841, 1010;
Comments on, 721.
Track construction methods, Pontiac, Mich., *581.
Trade of unprofitable lines to state suggested, 133.
                         gested, 133.

—Jitney service decreased, *862.
—Labor union contracts opposed by Commission, 131.
—Plans to speed traffic, 334.
—Reports on combined bus and railway service, 376.
—Traffic survey, Report, Details, *570, *617; Comments on, 605.
             Dick Prescott, *127, *289, *668, *819, *992.
      Dick Prescott, *127, *289, *668, *819, *992.

Discontinuance of lines:

—Abandonments in 1927, *51; Comments on, 40.

—Abilene, Kans.. 680.

—Akron, Ohio, 516.

—Amsterdam, N. Y., 1009.

—Atchison, Kans., 837.

—Belmar-Manasquan, N. J., 919.

—Bethapy Traction Co., 379.

—Biddeford, Maine, 1050.

—Boise, Idaho, 920.

—British tramways, 1007.

—Canton, Ohio, Abandonment sought, 219.

—Chattanooga, Tenn., 376.

—Columbia, S. C., Efforts to restore service, 295.

—Cortland, N. Y., 922.
Chantanoga, H. 9.22.
Chattanooga, Tenn. 376.
Columbia, S. C., Efforts to restore service, 295.
Cortland, N. Y., 922.
Detroit, Mich., Bus. 516.
Evansville, Ind., 516, 717.
Fulton, N. Y., 341.
Glens Falls, N. Y., 712, 904.
Grand Rapids, Grand Haven & Muskegon Ry., 791.
Groton, Conn., 1008.
Johnstown, Pa., 712.
Kansas City, Mo., 1007.
Keokuk, Iowa, 749.
Lincoln, England, 135.
Lincoln, England, 135.
Lincoln, Ill., 1012, 1090.
Lincoln, Reb., 521.
Lincoln, Reb., 521.
Marinette, Wis.,—Menominee, Mich., 177, 675.
Marshall, Texas, 301.
Marinette, Wis.,—Menominee, Mich., 177, 675.
Marshall, Texas, 301.
Moristown, N. J., 97, 250.
Nazareth, Pa., 717.
Neenah-Kaukauna, Wis., 1008.
Norton, Attleborn & Taunton St. Ry., 749.
Oakland, Cal., 595.
Olean, N. Y., 599.
Omaha, Lincoln & Beatrice Ry., 599, 839.
Paris, Ill., 869.
Plaistow-Newton, Mass., 259.
Portland, Me., 483. Docision, 1008.
Poughkeensie, N. Y., Hearings, 872.
Quincy, Ill., 417.
Reno, New., Comments on, 147.
Reco, New., Comments on, 147.

    —White Plains, N. Y., 749.

Doors, Car:

—Kansas City, Mo., Instruction panel explains operation [Weir], *1034.

—Interborough patent suit decision, 37, 485.

—Maintenance of, Details [Oakley], 434.

—Pneumatic doors, Maintenance methods, Details [Frebse], *441.

—Treadle, Use of, 384.
```

Duluth, Minn.:

—Duluth Street Ry.:
Safety record, 300.
—Duluth-Superior Traction
Financial report, 339. ction Co.: E Eastern Massachusetts Street Ry. (See Boston, Mass.): (See Boston, Mass.):

East St. Louis, Ill.:

—East St. Louis Ry.:

Franchise for improvements sought, 514.

New business campaign, 747.

—East St. Louis & Suburban Ry.:

Bus extensions planned, 1089.

New uniforms for employees, *833.

Paving exemption, 295.

Wage agreement renewed, 956. Wage agreement renewed, 956.

Education: (Sec also Employees):

—Cincinnati, Ohio, Foremen's conferences, 616.

—Employee, Comments on, 487.

—Engineer in the rôle of prophet, Comments on, 185.

—Illinois, Utility education in schools, 96.

—Industry education, Comments on, 687.

—Los Angeles, Cal., Program, Details, *584.

—Michigan City, Ind., Educational films, 28.

—Milwaukee, Wis., Employee training, Details, *1065. Comments on, 1059.

—New Orleans, La., Instruction methods for trainmen [Murphy], *401.

—Ohio schools use public utility textbook, 787. trainmen [Murphy], *401,

Ohio schools use public utility textbook, 787,

—Portland, Ore, Library enlarged, 1046.

—Public Utility Courses:

Harvard University, 134.

University of Illinols, 134.

University of Wisconsin, 413,

—School for arc welders, Cleveland, Ohio, 583,

—Special Libraries Association, Work of, 330,

—Technical graduates, Place in industry, Comments on, 1057,

—Toronto, Can., School and equipment for instructing trainmen [McRae], *608.

—Universities offer combined travel and engineering courses, 296,

Electrical equipment: neering courses, 296.

Electrical equipment:

—Car controller maintenance, Details [Beers],

*465; Comments on, 427.

—Electrical glossary published, 796.

—New York, Westchester & Boston new cars,

Details [Smith], *235.

—Osgood Bradley sample car, Details, *1020;

Comments on, 1018. Comments on, 1018.

-Philadelphia, Pa., Subway cars, *942.

-Pittsburgh, Pa., experimental cars [Gordon],

*888; Comments on, 885.

-Track switches, Europe, *947.

Electric Rullway Association of Equipment Men
Sonthern Properties:

-Winter meeting, Report, 204. Electric Railway Journal:

—Associated Business Papers, Inc., National award, 265; Comments on, 969.

—Personnel and history outline, 1. Elmira, N. Y.:

—Elmira Water, Light & Railroad Co.:
Public relations improved, 212. El Paso, Texas:

—El Paso Electric Co.:

Brady Memorial presentation, *322.

Brady prize for safety, Details, *193.

Bridge planned to Juarez, Mexico, 485.

Sightseeing bus service advertised, 1008. Employees:

—American Waterworks Co., Essay prize offered. O5.

-Atlanta, Ga.:
Training by individual instruction, *361.
Veterans awarded emblems, 334.

-Baltimore, Md., Money saved on coal orders, 1034.

-Boston, Mass., Supervisors' Association bylaws, 254.

-Chicago, III.:
Accident record, 954.
First aid graduates, 738.

-Cleveland, Ohio, Personnel, work, Details. First aid graduates, 738.

Cleveland, Ohio, Personnel work, Details, *767, 1007.

Dallas, Texas, Courtesy campaign, 298.
Denver, Colo., Trainmen's bonus system, 728.
Detroit, Mich., Tax relief sought, 920.

Education for, Comments on, 487.

Ford Motor Co., Studies on employee transportation, 92.

Gary, Ind., Magazine established, 96.

Gary, Ind., Vacation schedules, Comments on, 1019.

Grand Rapids, Mich., Improvement suggestions asked, 557.

Greensboro, N. C., Prizes for "suggestion" letters, 414.

Houston, Texas, Safety bonus, 334. letters, 414.

-Houston, Texas, Safety bonus, 334.

-Jackson, Tenn., Service records, 96.

-Kansas City, Mo., Labor turn-over, *490.

-Kansas City, Mo., Instruction in treadle door operation [Weir], *1034.

-Little Rock, Ark., Accident prevention campaign awards, 514.

-Los Angeles, Cal., Manuals of operation and accounting issued to [Jordan], *359.

-Los Angeles, Cal., Physical examination of trainmen [Weber], 1080.

-Louisville, Ky., Connelly award, 28.

-McAlester, Okla., Employees organize to boost service, 208.

-Methods of selection, Comments on, 762.

-Milwaukee, Wis., Building & Loan Ass'n, report, 274.

-Milwaukee, Wis., Outdoor training, Practice track and road, Details, *1065; Comments on, 1059.

-Nashville, Tenn., Veterane' banquet, 372.

-National Safety Council issues magazine for, 708.

Employees (Continued):
-Newark, N. J.: -Newark, N. J.:

-Newark, N. J.:

Bonuses, *94; 956; Comments on, 956.

Welfare work for, 412.

-New Orleans, La., Instruction methods
(Murphy), *401.

-Philadelphia, Pa.:

Participation earnings, 212.

-Prize for safety slogan, 787.

-Portland, Ore., Twenty-year Club, 250.

-Providence, R. I., Stock subscribed for, 259.

-Psycho-technical selection, Paris [Verdollin], *742.

-Richmond, Ve. Statter, Paris [Verdollin], *742. Psycho-technical selection, Paris [Verdollin],

- 742.

Richmond, Va., Stock purchases, *404.

St. Louis, Mo.:

Dressing rooms improved, 298.

New uniforms for, *833.

- Salt Lake City, Utah, Safety contest winners,
 *671.

Selection of employees [Shellow], 368;
 [Segard], 1041; Comments on, 1058.

- Stone & Webster ask employees for slogan
 297.

- Technical graduates, Place in industry, Comments on, 1057.

- Training the operating force [McIlraith],
 1031.

- Turin, Italy, Housing plans, 400.

- Westinghouse annual banquet, Comments on,
 267.

- Wilmington, N. C., Bonus plan, 233.

- Winnipeg, Can., Dispute settled, 557.

Energy checking devices:

- Circuit breakers, Midi Ry, substations, Details, *622.

Energy consumption: Energy consumption:

—Cleveland, Ohio, Aluminum car, 904,
—Energy used by electric railways, *818,
—Germany high-speed line, Report [Breslauer], -Springfield, Mass., Experimental car [Harwood], 550. Engineering index service, A. S. M. E., 510. Eric, Pa.:

-Buffalo & Eric Ry.:

-Receiver appointed, 1010.

-Eric Ry.:

Track reconstruction methods [Lewis],

*812. Erie Raitroad:
—Niagara line, Negotiations for, 138, 631. -Niagara line, Negotiations for, 138, 631.

European practice:
-Anti-climber coupler, Germany [Mattersdorf],
933.
-Berlin, Germany, Support for car ends in
shop, 242.
-Cologne, Germany, Track laid without ties
[Schwanter], 977.
-Current collector for track tools, Paris. *739.
-Donble-truck car, Glasgow, Scotland, Details,
9398.
-Electrification methods, Germany [Healy],
937.
-English tramway situation Comments on English tramway situation, Comments on, -Enaish tailway situation, Comments on, 568.

-Fare collection system. Paris [Mariage], *1078.

-Glasgow, Scotland, to allow ads in cars, 415.

-Improvements in rails and ties [Noorbeeck], *912; Comments on, 887.

-Inert gas protects bus fuel, Paris [Blake], *395.

-Italy, Overhead contact system, Details [Healy], *317.

-Jugoslavia track construction methods i Manojlovitch], *115.

-Mercury are rectifier substations, Details, *622.

-One-ma car and bus design [de Ribes], *704* 622.
 One-man car and bus design [de Ribes], *704 · [Bacqueyrisse], *910; Comments on, 887.
 One-man car operation, Holland [Nieuwenhuis], 859.
 Overhead construction, Details [Healy], *8; huis], 859.

Overhead construction, Details [Healy], *8;
Comments on, 3.

—Parallel vs. radial axle cars [Castaing], 860.
—Psycho-technical selection of employees, Paris
[Verdollin], *742.

—Radial-axle car design [Harmel], *857.

—Railway practices discussed at Rome meeting,
*947. -Spray painting methods, Leipsic, Germany, *817.

Track construction in paved streets. Details [Blake], *535.

Track construction on city reservations [Lenartowicz], *858.

Track vibration tests, Berlin, Germany, *403.

Turin, Italy, Housing plans, 400.

Use of welding in car construction, 932.

Washing machines for cars, Details, *111. —washing machines for ears, Details, 22.

Evansville, Ind.:

—Evansville & Ohio Valley Ry.:

Car purchase authorized, 142.

Bus substitution plans, 516, 595.

—Evansville, Suburban & Newburgh Ry.:

Papers boom service, 710. F Fnirmont, W. Va.:

--Monongahela-West Penn Public Service Co.:

Boring armature bearing housings [Duffy],

*626.

Cars ordered, Details, 1095.

Fress for bearing removal [Duffy], *119.

Prizes awarded for service essays, 1005.

Prizes awarded for service essays, 1005.

Fare collection:

—Atlanta, Ga.:
School ticket sale rearranged, 479.
Tickets sold with bread wrappers, 134,
*400.

—Buffalo, N. Y., Transfer forms in use, Detalla
I Snowl, *304.

—Denver, Colo., Transfers simplified, 1004
—Faro box orders, Newark and Brooklyn, 423.
—Indianapolis, Ind., Transfer changes extended,
336.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Iliustrated. c Communications.

```
Fan Collection (Continued):

-London, England, Ticket-issuing machines,
Details, *579.

-Monthly pass, Rate reduced, Los Angeles, Cal.,
1085.

Monthly pass, Rate reduced, Los Angeles, Can. 1085.
Mootreal, Can., Ticket refund, 713; Comments on 488.
Oklahoma, Railway and bus tickets, 136.
Paris, France, New system adopted [Mariagel, *1078,
Passes encourage riding [Jackson], 830.
Providence, R. I., Transfer interchange, 375.
St. Louis, Mo.:
Pass tickets for employees, 708.
Pay-enter system voted on, 412.
Transfer privileges broadened, 745.
Season ticket arrangements, London, England, 1087.
Simple payment system, Comments on, 763.

 -ocason treat arrangements, London, England, 1087.

—Simple payment system, Comments on, 763.

—Sunday pass:
Gary, Ind., 590, 748, 1064.
St. Louis, Mo., 132, 414, 679.

—Weekly pass:
Alliance, Ohio, 174.
Chicago, Hearings on abolition, 748.
Hallifax, N. S., 92.
Levis, Que., Revenue increased by [Weyman], 5901; Comments on, 885.
Ogden, Utah, 707.
St. Petersburg, Fla., 961.
Youngstown, Ohio, 130, 371.

—Wilkes-Barre, Pa., Zone limits approved, 92.
   -Wilkes-Barre, Pa., Zone limits approved, 92
Fare decreases:
-Chicago-Gary, Ind., Bus, 299.
-Gary, Ind., 1085.
-Melrose, Mass., 834.
-Muskogee, Okla., 415.
-Pacific Electric Ry., 630, 871, 1008, 1085.
-Pacific Northwest Traction Co., 410, 632.
-Paris, France [Mariage], *1078.
-Philadelphia, Pa., Bus, 788.
-South Bend, Ind., Commutation, 1085.
-Worcester, Mass., Bus, 134.
 Fare Increases:

-Baltimore, Md., Details, 293; Comments on, 287.

-Cairo, Ill., 132.

-Canton-Massillon, Ohio, 131.

-Cleveland, Ohio, 1002.

-Council Bluffs, Iowa, 93.

-Dayton, Ohio, 1004.

-Dover, Ohio, 513.

-Fort Worth, Texas, Bus, 299.

-Galveston, Texas, 1048.

-Green Bay, Wis, 370.

-Jamestown, N. Y., 513.

-Joplin, Mo., 708.

-Kansas City, Mo., Bus, 631, 875; Comments on, 606, 848.

-Lawrence, Kans., 958.

-Lawrence, Kans., 958.

-Louisville, Ky., Bus, 480.

-Macon, Ga., 131.

-Madison, Wis., 252.

-Mobile, Ala., 28.

-Nahant-Lyon, Mass., 747.

-Oakland, Cal., Ferries, 917; Commuter, 1003.

-Philadelphia, Pa., Decision, 1085;

-St. Louis, Mo., 172; Decision, 1082; Comments on, 1058.

-San Diego, Cal., Bus, 97.

-San Jose, Cal., 707.

-Sioux City, Iowa, 787.

-Tulsa, Okla, 336.

-Upper Darby, Pa., 671.

-White Plains-Tarrytown, N. Y., Bus, 176, 253.

-Windsor, Can., 710.
     Fare Increases:
—Baltimore, Md., Details, 293; Comments on,
               253.
—Windsor, Can., 710.
—Youngstown, Ohio, 130.
   -Youngstown, Ohio, 130.

Fares:
-Adequate fares essential to service, Comments on, 186.
-A.E.R.A. traffic, fare, and wage figures, 98, 596, 677, 755, 840, 964.
-Baltimore, Md., Controversy, 211, 331, 477, 557, 591, 673, 831, 1046; Comments on 309.
-Biddeford, Maine, Patrons ask for increase, 130; Situation, 1005.
-Bus fares inadequate, Comments on, 308.
-Chicago, Ill., Fare hearings, 296, 557, 872, 1046.
-Cleveland, Ohio, Hearings, 670, 873.
-Covingtion, Ky., Increase sought, 915.
-Dallas, Texas, Increase application, 480; Comments on, 146.
-Denver, Colo., Controversy, 370.
-Detroit, Mich., Situation, 833, 1044; Comments on, 1059.
-Distribution and trend of 1917-27, *42.
```

ments on, 1059.

—Distribution and trend of 1917-27, *42.

—Economic limit of car fare [Swaine], *935;
Comments on, 927.

—Gary, Ind., Excursion rates, 1085.

—Hamilton, Ont., Hearings, 958.

—Harrisburg, Pa., Increase sought, 1044.

—Indianapolis, Ind., Transfer charge continued, 479.

Ottawa, Out., Hearings, 872.

Ottawa, Out., Hearings, 872.

Ottawa, Out., Hearings, 872.

Ottawa, Out., Hearings, 872.

Ottawa, Out., Monthly permit controversy, 371, 673.

Ottawa, Carlon, Controversy, 915.

Ottawa, Carlon, Carlon

-Richey's conspectus of indexes, 179, 340, 520, 715, 879, 1051; Changes in, 1051.

Fares (Continued):

—Rome, Ga., Increase sought, 917, 958, 1048.

—Sacramento, Cal., Hearings, 371,

—St. Louis, Mo., Hearings, 131, 557; Decision, 1082; Comments on, 1058.

—St. Louis, Mo., Zone fares changes, 630, 917,

—St. Faul, Minn., Hearings, 96.

—Santa Barbara, Cal., Experimental rates, 91.

—Savannah, Ga., Hearings, 707, 873.

—Schenectady, N. Y., Hearings, 133, 211.

—Seattle, Wash, Five-cent fare plan, 28,

—Shreveport, La., Increase sought, 332.

—Trend in 1927 [Richey], *70.

—Tulsa, Okla., Increase sought, 130.

—Washington, D. C., Increase sought, 130.

—Washington, D. C., Increase sought, 412, 917, 1046.

—Wichita, Kans., Newspaper tells need for fare -Wichita, Kans., Newspaper tells need for fare increase, 674. Federat Trade Commission to investigate public utilities, 333; Comments on, 307. Financial: Alliance, Ohlo: -Aliance, Unio:
Electrical equipment sold, 258,
Refinancing plans, 98.
-Allied Power & Light Co., organized, Details,
*785; Comments on, 762.
-Allied Power & Light stock issue offered, 878,
-Altoona, Pa., Improvement program, Details,
*498. Buffalo, N. Y., Capital stock changed, 636,—Canadian park property bought by electric railway, 560.—Chicago City Ry, to pay interest, 138.—Chicago Rapid Transit Co., bond issue, 920.—City Utilities Co. asks to hold stock of St. Louis Ry., 178.—Colorado Springs, Colo., Railway outlook, 301.—Cortland, N. Y., Railway sale sought, 636.—Davenport, Iowa, Preferred dividend, 563.—Des Moines, Iowa, Preferred stock issue, 180.—Detroit, Mich., Bus operating survey, 1088.—Detroit, Mich., Situation, 1044; Comments on, 1059.—Eastern Mass, St. Ry., dividend earnings, 680. -Eastern Mass. St. Ry., dividend earnings, 680.

-Eastern Mass. St. Ry., dividend earnings, 680.
-Foreclosures:
-Binghampton Ry., 99, 560.
-Chicago Railways, 258, 481.
-Geneva, Seneca Falls & Auburn R.R., 1012.
-Grand Rapids, Grand Haven & Muskegon Ry., 481, 791.
-Indianapolis & Cincinnati Traction Co., 678, 755, 839.
-Michigan Electric Ry., 1090.
-Milford-Uxbridge Street Ry., 380.
-Morris County Traction Co., 258, 481.
-New York & Long Island Traction Co., 521.
-Olean, N. Y., 599.
-Pennsylvania & Maryland Street Ry., 218.
-Port Arthur, Texas, 138.
-Review of 1927, Statistics, *82.
-St. Louis, Mo., Receiver discharged, 961.
-Shelburne Falls, Mass., 791.
-South Bend, Ind., 139.
-Syracuse, Lake Shore & Northern R.R., 637.
-German issue offered in American market. -German issue offered in American market. 961. Harrisburg, Pa., Dividend passed, 596. Highwood, Ill., Stock issue, 920. Huntington, Va., railway properties sold, 31.

Highwood. Ill. Stock issue, 920.
Huntington, Va., railway properties sold, 31. 31.
Illinois Terminal lease of three railways, 218, 414, 1002.
Indianapolis, Ind., Bond issue, 418, 520.
Investment value of railways advertised by broker, *482.
Kansas City, Mo., Bond salc, 259, 517.
Kansas City, Mo., Budget submitted, 139.
Lynchburg and Roanoke, Va., railways sold, 218.
Massachusetts railways on legal investment list, 1090.
Maysville, Ky., railway sold, 257.
Millerton Electric Light Co. sold, 789.
Milwankee, Wis., railway merger, 961.
Minnapolis, Minn., Railway budget, 183.
Montreal, Can., Stock offerings, 920.
Newark, N. J., Budget for 1928, 174.
New York State Rys. sold, 1009; Comments on, 1019.
Norwich, Conn., Railway stock transfer, 179.
Ohio railways improvement plans, 759.
Oklahoma City bond issue, 180.
Oklahoma Ry, power plant sold, 922.
Omaha, Neb., Bond extension agreement, 639.
Ottawa, Can., Railway situation, 562.
Pacific Electric Ry, expenditures in 1927, 174.
Penn-Ohio Edison merger, 638, 838.
Philadelphia, Pa., Capital stock increase, 257, 521, 680, 878, 1052.
Philladelphia, Pa., Corporate simplification, 1010, 1050; Comments on, 1018.
Phillipsburg Transit Co. financial situation, 340.
Phone, Ariz., Railway bond issue, 378.
Pittsburgh Rys. purchase Homestead line,

-mmanapons, Ind., Transfer charge continued, 479, 479, 479, —Lorain, Ohio, City denics increase, 873, —Los Angeles Ry., Controversy, 95, 214, 554, 672, 708, 747 —Montreal distributes lost ticket fund, 483, —New York City:

Commuter fares, Comments on, 309, Comptroller's fare plan, 172, Controversy, 211, 252, 333, 373, 412, 477, 514, *591, 567, 745, 869, 954; Comments on, 187, 226, 721, 846.

—Oakland, Cal., Fare hearings, 171, 412, 513, 558, Ottawa, Out Hearings, 272

-Phoenix, Ariz., Railway bond issue, 378. -Pitsburgh Rys. purchase Homestead line,

-Pittsburgh Rys, purchase Homestead nne, 638.

-Portland, Ore., Railway merger, 378.
-Princeton, W. Va., Railway and lighting properties separated, 920.
-Pueble utility bonds, History of, 599.
-Pueblo, Colo., Rehabilitation methods, Details, *231.

-Quebec, Can., Railway sold, 638.
-Railway costs and fares, 1927 [Richey], *79.
-Railway earnings, Effect of open winter, Comments on, 488.
-Receiverships:
-Receiverships:
- Auburn & Syracuse Electric R.R., 1092.
- Buffalo & Eric Ry., 1010.
- Detroit, Jackson & Chicago Ry., 637.

Financial:—Receiverships (Continued):
Puget Sound Electric Ry., 379, 637,
Record for 1927, Statistics, *82; Comments
on, 146.
Southern Michigan Ry., 302, 563.
Springfield Ry., Ohio, 180.
Tacoma, Wash., Situation, 218; Comments
on, 185.
—Reorganizations:
Benton Harbor-St. Joseph, Mich., 560.
Binghamton Ry., 716, 922.
Cincinnati, Lawrenceburg & Aurora Electric Street R.R., 378.
Delaware & Hudson Co., 878.
Detroit United Ry., 754, 759, *841, 1010;
Comments on, 721.
Fort Wayne, Ind., 302.
Halifax, N. S., 380, 483.
Illinois Traction Co., 257,
636, 789, 842.
Indianapolis & Cincinnati Traction Co., 257,
636, 789, 842.
Loternational Ry., 302, 377; Comments on,
345.
Kansas City, Lawrence & Topeka Electric
R.R., 175, 300, 250, 552, 252 O.50. 789, 842.
International Ry., 302, 377; Comments on, 345.
Kansas City, Lawrence & Topeka Electric R.R., 175, 302, 370, 554, 784; Comments on, 420.
Kansas City Rys., Bondholders hearing, 257.
Lackawanna & Wyoming Valley R.R., 377.
Michigan Electric Ry., 961.
Milford & Uxbridge Street Ry., 838.
Northern Ohio Power Co., 678.
Oklahoma Ry. receivership ended, 139.
Penn-Ohio Edison Co., 678.
Phoenix, Ariz., Plan for, 255.
Public Service Ry., 98, 217.
Rockford-Freeport Ry., 918.
Saulte Ste. Marle, Mich., 791.
Second Avenue R.R., 840.
Terre Haute, Indianapolis & Eastern Traction Co., 596, 1012.
West Chester Street Ry., 517.
—Richmond, Va., Bond issue, 596, 714.
—Rockford, Ill., Railway sold, 714.
—St. Louis, Mo., Stock issue, 1050.
—San Antonio, Tex., Railway consolidation, 178.
—San Francisco, Cal., Situation, Report on, 1091.
—Santa Rosa, Cal., Railway purchase offered by Western Pacific, 340. San Francisco, Cal., Situation, Report on, 1091.
Santa Rosa, Cal., Railway purchase offered by Western Pacific, 340.
Saving banks investment bill, New York, 517; Comments on, 488.
Sciato Valley note issue, 378.
Seattle. Wash.:
Bond payment made, 380.
Budget for 1928, 143.
City debt diminished, 517.
Interest default, 180.
Railway loan fund, 257.
Situation, 714.
Sinux City, Inwa, railway sold, 418.
South Bend, Ind., Bus property sold, 875.
Spokane, Wash., Utility merger planned, 179.
United Suburban Ry., Financial situation, 789.
Utility bonds, recommended by N. Y. Jeris. United Suburban Ry., Financial situation, 789.
Utility bonds recommended by N. Y. legislature, 301.
Vancouver, B. C., Railway sold, 677, 878.
Washington, D. C., Railway merger negotiations, 180, 258, 301, 481, 521, 597, 677, 840, 880, 920, 961, 1090; Comments on, 489, 845.
West Chester, Pa., Financial readjustment, 179.
W. B. & A. purchases nower proposition. W. B. & A. purchases power property, 878.
Wichita Falls, Texas, Railway sold, 680.
Windsor, Ont., 680.
Wisconsin Rapids St. Ry, stock reduced, 259.

Financial reports:

—Akron, Ohio, 716,

—Alliance, Ohio, 872,

—A.E.R.A. report on railway operations, 1927,

750, 961; Comments on, 723.

750, 961; Comments on, 723.

Anderson, Ind., 963.

Atlanta, Ga., 963.

Baltimore, Md., 258, 521, 713.

Bamberger Electric R.R., 1092.

Boston Elevated Ry., 562, 791.

Brooklyn-Manhattan Transit Corp., 840.

Buffalo, N. Y., 599, 880.

Capital Traction Co., 1011.

Capital Traction Co., 1011.

Chattanooga, Tenn., 1012.

Chicago City & Connecting Rys., 259.

Chicago Rapid Transit Co., 377.

Chicago Surface Lines, 257, 518; Comments on, 528.

Cincinnati, Hamilton & Day on Ry., 790;
 Comments on, 763.
 Cincinnati Street Ry., 560; Comments on, 529.

-Cincinnati Street Ry., 560; Comments on, 529.

Denver, Colo., 483.
Department of Street Rys., Detroit, 139, 379, 637, 677, 878.

Duluth-Superior Traction Co., 339.

-Eastern Massachusetts Street Ry., 259, 638.

-Fresno, Cal., 714.

-Grand Rapids, Mich., 217.

-Hamilton, Can., 1009.

-Hattlesburg, Miss., Bonds called, 964.

-Highwood, Ill., 879.

-Honolulu Rapid Transit Co., 964.

-Hudson Valley Ry., 639, 964.

-Hudson Valley Ry., 639, 1050.

-Indianapolis Street Ry., 1092.

-Interborough Rapid Transit Co., 380, 1050.

-Kansas City Public Service Co., 598, 755, 880.

-London Underground Rys., 1052.

Associated Fronto Service Co., 538, 735, 880, London Underground Rys., 1052.

Loulsville, Ry., 921.

Market Street Ry., 638; Comments on, 685.

Milwaukee, Wis., 300.

Municipal Ry. of San Francisco, 31; Comments on, 146.

New York, New Haven & Hartford R.R., 839.

New York Rys., 1012.

```
Finnocial reports (Continued):

—Peoples Motor Coach Co., 918.

—Philadelphia Rapid Transit Co., 418.

—Pittsburgh Rys., 678; Comments on, 971.

—Portland R.R., 1012.

—Public Service Corporation, 597; Comments on, 568.

—Pueblo, Colo., *231.

—St. Louis Public Service Co., 99.

—Salt Lake City, Utah, 1012.

—San Diego, Cal., 599.

—San Francisco Municipal Ry., 1091.

—San Jose, Cal., 1012.

—Santa Rosa, Cal., 638.

—Seattle Municipal Ry., 349.

—Stark Electric R.R., 389.

—Stockton, Cal., 1009.

—Sydney, New South Wales, 135.

—Tampa, Fla., 599.

—Terre Haute, Ind., 1053.

—Texas Electric Ry., 715.

—Texas Interurban Ry., 598.

—Tientsin, China, 612.

—Toledo, Ohio, 178, 596, 677.

—Toledo Traction Co., 341.

—Winnipez, Man., 922.

—Wisconsin Public Service Corp., 716.

Fitchburg, Mass.;

—Fitchburg & Leominster Street Ry.;

--Wisconsin Fusia:
Fitchhurg, Mass.:
--Fitchburg & Leominster Street Ry.:
New cars, Specifications, *843.
 New cars, Specifications, *843.

Fort Wayne, Ind.:
Indiana Service Corporation:
Financial reorganization, 392.
Ware arbitration, 252, 556, 834.
Ware increase denied, 873.

Fort Worth, Texas:
—Northern Texas Traction Co.:
Bus fares increased, 299.
Laundry bars advertise service, 319.
Personnel changes, 101.

France:
   France:
             conce:
-Locomotives, High-power, Details, 323,
-Madagascar to electrify, 525,
-Midi Railway;
Substation operation, Details, *622,
-Paris;
Express locomotives ordered, Details, 895,
Fare collection, New system [Mariage],
*1078,
Inert gas protects bus fuel [Blake], *395,
One-man cars and buses, Trials [de Ribes],
*704,
Psycho-technical selection of employees
One-man cars and busea, Trials [de Ribea],

*704.

Psycho-technical selection of employees
[Verdollin], *742,
Radial axle tests [Castaing], 869.
Track construction methods, Details
[Blake], *535.

Paris-Lyons-Mediterranean Ry.:
Cars washet, by machine, Details, *111.
Paris Surface Lines:
Current collector for track tools, *739.
Franchleses:
Berkeley, Cal., Bus ordinance, 337.
Buffalo, N. Y., Bus permit, 959.
Chicago, Ill., Negotiations, 673.
Cleveland, Ohio, Operating contract, 745;
Comments on, 687.

Cleveland, Ohio, Negotiations, 410, 593.

Dallas, Tex., Extension, 411.
Denver, Colo., Negotiations, 252, 873.
East St. Louis, Ill., New franchise, 295, 515.
Grand Forks, N. D., New franchise sought, 174.
Ullinois Terminal, New franchise, 1086.
             -Kansas City, Mo., Bus franchise plan, 177,
631, 711, 747, 875, 918; Comments on,
846
Market Steel Relation Bus. 875.

—Knovville, Ky., Bus franchise 176, 253, 480, 558, 594; Details, 634; Comments on, 606.

—Market Street Railway Negotiations. 1086.

—Market Street Railway Negotiations. 1086.

—New York City, Indeterminate franchise legislation. Comments on. 605.

—New York & Queens County Ry., Bus franchise sought, 594.

—New York terminable permit law, 555.

—Oklaboma City, Okla., Ordinaoce for belt line, 590.
                Omaha, Neb., Negotiations, 785, 872, 1048, 1085.
             -Philadelphia. Pa.. Surface-car subway or-
dinance, 599, 916.
            -Port Arthur, Texas, New franchise, 584,
-Reading R.R. bus franchise, 216, 675,
-St. Paul, Minn., Bus amendment proposed,
512, 559,
-Seattle, Wash., Ordinance modifies franchise,
412,
            Spokane. Wash.. Extension sought, 554.

Syracuse, N. Y.. Permanent bus franchises sought, 595.

Terminable permit principles. Details [Dillavoul], 495: Comments on, 527.

Tientsin, China, Railway franchise [Kung], 612.
             612.

-Toledo, Ohio, Franchise negotiations, 297,

479, 512, 631, 787.

-Toledo, Ohio, New ordinance, 916, 958.

-Wichita, Kans. New franchise sought, 556.

-Zanesville, Ohio, New franchise, 515.
   --- Cancesvine, Onio. New Iranchise, 515.

Freight and express:

--- Daoville, 1ll.—Crawfordsville, Ind., Interchanging system, 514.

--- Highwood, Ill., Disoatch claims shown by graphs [Blackhall], *930; Comments on, 927.
     927.

- Indianapolis, Ind., Freight expansion, 424.

- Michigan R.R. transports furniture, *297.

- North Shore Line freight business, 94.

- Oklahova City, Okla., Freight belt line to be hullt, 415.
```

```
Great Britain:—Glasgow, Scotland (Continued):
Steam and electric roads combine to meet
bus competition, 337.
—Lanarkshire, Scotland, light-weight car [Mol-
ler], *494.
Freight and express (Continued):

—Providence: R. I., Freight abandonment briefs filed, 254.

—Rochester, N. Y., Freight service subway contract, 372.

—Salt Lake City, Utah, Freight service, Details (Needham), *196.

—South Bend, Ind., Motor freight service, 216; Details, *693; Comments on, 722.

—Texas Electric Ry, starts freight service, 672, 917.
                                                                                                                                                                                                                          -Lanarkshire, Scotland, light-weight car [Moller]. *494.

-London:
Cars washed by machine, *111.
Intercommunication system improved, 1907.

-London Underground Rys.;
Car overhaul program, 306.
Financial report, 1052.
Motor order, 759.
Public relations work, 336.
Rolling stock ordered, 1087.
Season ticket arrangements, 1087.
Ticket-issuing machines, Details, *579.

-Manchester, England, Transit improvements planned, 874.
Metropolitan Ry.;
New subway car, *738.
Scotland, Bus and tramway co-ordination, 135.
-Traction contracts, 336.
 Fuels:
—Inert gas protects bus fuel, Paris [Blake].
*395.
                                                                                                    G
Galveston, Texas:

—Galveston Electric Co.:
Fare increase, 1048.
Track constructed with T-rails, 705.
Garages:
—Hamilton, Ont., Details [Porter], *1068,
Excursion rates, 1085,
—Worcester, Mass., Details, *274, *848; Comments on, 885.
                                                                                                                                                                                                                          135.
—Traction contracts, 336.
—West Riding, England, to install buses, 593.

Green Bay, Wls.:
—Wiscosin Public Service Co.:
Bus service plans, 177.
Bus substitution in Marinette and Menominee, 675.
Fare increases, 370.
Gutters reduce window cleaning [Bodoh].
*988.

Remodeled cars Design Petails [Badoh]
         ary. Ind.:

-Gary Rys.:

-Accident record; Comments on, 1019.

-Bus operations opposed, 969.

-Car decorated for, guessing contest, 132.

-Coffio award sought, 707.

-Compressed air vacuum cleaner [McClain], *987.

-Employee magazine established, 96.

-Excursion rates, 1085.

-Insurance policies given employees, 256.

-Passenger cars converted for snow fighting, 223.

-Preferred dividends to be paid quarterly, 418.

-Public guessing contest, 132.
                                                                                                                                                                                                                                                 Remodeled cars, Design, Details [Bodoh], *275.
Roller bearings installed for trial, 643.
                                                                                                                                                                                                                            Greenshoro, N. C.:

-North Carolina Public Service Co.:
Employees prize for "suggestion" letters,
414.
         418.
Public guessing contest, 132.
Sunday pass installed, 590, 748, 1064.
Weather hureau installed, 295.
-Shore Line Motor Coach Co.:
Fares reduced, 299.
Operating offices moved, 558.
Sale of lines, 97.
                                                                                                                                                                                                                            Halifax, Nova Scotia:

—Nova Scotia Tramways Power Co.:
Reorganization, 389, 483.
Weekly pass installed, 92.
                                                                                                                                                                                                                             Hamilton, Ont., Can.:

—Hamilton Street Ry.:

Car shop and garage, Details [Porter],

*1068.
 Gary & Southern Traction Co. (See Crown Point, Ind.)
Point, Ind.)
Gears and pinloos:

—Gear maintenance and equipment [Squier],
*805.

—Maintenance methods. Details [Sawtelle],
*444.
Georgia Power Co. (See Atlanta, Ga.)
Georgia, State of:
—Busea regulated by Commission, 338.
—Conference on bus regulation, 375.
                                                                                                                                                                                                                                                  Fare and wage hearings, 835, 958. Financial report, 1009.
                                                                                                                                                                                                                           Hampton, Va.:

—Virginia Public Service Co.:

Car repair records [Kelly], *123.

Truck for handling car wheels and axlea

[Kelly], *1035.
                                                                                                                                                                                                                          [Kelly]. *1635.

Harrlshurg, Pa.:
—Harrishurg Rys.:
Bridge, Sale negotiations, 922.
Connecting rod for track switches [Gerhart]. *284.
Dividend passed, 596.
Fare increase sought, 786, 1944.

Harvard Advertislog Award:
—James H. McGraw wins 1927 award, *268.
—Place of advertising in business progress [McGraw], 269.
—Provisions for 1928 award, 1015.

Havaon, Cuba (See Cuba):
Germany:

—Berlin Elevated & Underground Ry.:

Support for car ends in overhaul shop.
*242.

Berlin Surface Lines:
Effect of unsprung car weight on track
wear, Tests, *493.

Berlin traffic report, 1997.

Bus development, 874.

Colorne, Track laid without ties [Schwanter],
*979.
                                                                                                                                                                                                                         -Provisions for 1928 award. 1015.

Havaon, Cuba (See Cuba):

Hawall:
-Honolulu Rapid Transit Co.:
Financial reports, 964.

Heavy electric traction:
-A.R.E.A. discusses, 509.
-Austria, Electrification held up, 493, 593.
-Boston, Revere Beach & Lynn R.R., Electrification costs estimated, 183, 842.
-Catenary and pantograph construction, Europe [Healyl, *8; Comments on, 3, Cbicago, Electrification reduces smoke pollution, 576.
-D. L. & W. electrification place, *707, 718; Comments on, 685.
-Electrified extensions in 1927, Statistics, *53, Germany, High-speed line planned, Report, Details [Breslauer], *501.
-Germany, Progress and methods of electrification [Healyl], *937.
-Lackawanna R.R. electrification plans, 553.
-Logsing rallroad electrified, Details, *727.
-Matal, South Africa, Electrification, 416, New York City, Electrification plans, 834.
-Reading R.R., Electrification plans, 747.
-Siam electrification, 874.
-Spain, Electrification, 874.
-Spain, Electrification plans, 1987.
-Switzerland, Electrical operation, Details, *198.
-Wales, Electrification plans, 135.
-Hickswille Railway:
-Adventures of Old Man Trouble, *125, *287, *667.

Highwood, Ill.:
-Chicago, North Shore & Milwaukee R.R.:
         -Electrification, Progress and methods [Healy],
                                                                                                                                                                                                                              Havaon, Cuba (See Cuba):
  —German State Ry., Service improvements, 1087.
1087.

--Hamburg Elevated Ry.:
Anti-climber coupler prevents damage in collisions [Mattersdorf], *933.
Gold loan offered in American market, 961.

--High speed electric line planned, Report on, Details [Breslauer], *591.

--Leipsic Street Railways:
Spray painting methods, Details, *817.

--Track construction methods, Details [Blake], *535.

Westphylic Rond edg. 533.
          -Westphalla, Bond sale, 593.
Gleos Falls, N. Y.:

—Hudson Valley Ry.:

Abandonments, 964,
Financial report, 639,
Old cars burned, 1009,
Partial bus substitution, 712.
Partial bus substitution, 712.

Gloversville, N. Y.:

—Fonda, Johnstown & Gloversville R.R.:

Bus permit sought, 838.

Inclusion in New York Central system sought, 596.

Line abandaned, 1009.

Right-of-way appraisal, 680.

Wage reduction, 872.
Government ownership [Ives], 508; Comments on, 799.
Grand Rapids, Holland & Chicago Ry. (See
Holland, Mich.)
Holland. Mich.)

Grand Rapids, Mich.:

—Grand Rapids, Grand Haven & Muskegon, Ry.:

Foreclosure proceedings, 481.

Operations abandoned, 791.

—Grand Rapids R.R.:

Employees asked for improvement suggestions, 557.

Financial report, 217.

Gene Tunney entertained, *413.

Song dedicated to the trolley, 335.

—United Suburban Ry.:

Operating record, 553.

Great Britaio:
                                                                                                                                                                                                                          Great Britain:

—Bus substitutions, 1007.

—Edinburgh, Scotland:

Car purchase approved, 874.

Unbulstered seats adopted, 337.

—English tramway situation, Comments on, 568.
```

Historical:

—Barcelona, Spain, Transit developmenta, 135.
—Huntington, Va., Railway history, 31.
—Transportation in foreign lands, 334.

Holland:
—Hague Tramwaya naw type cars, 323.
—One-man car operation [Nieuwenhuia], 859.

Homestead, Pa.:

-Homestead & Mifflin Street Ry.:

-Pittsburgh Rya. purchases, 638.

Honolulu Rapid Transit Co. (See Hawaii). Horse rar presented to Henry Ford by Brook-lyn City R.R., *786; Comments on, 762.

lyn City R.R., *786; Comments on, 762,

Houston, Texas:

Houston Electric Co.:

Budget for 1928, 102.

Bus service extended, 375.

Car carried Christmas Carol singers, 27.

City purchase suggested, 591.

Express bus service to Harrisburg, 97.

Safety bonus, 334.

Huntington, W. Va.:

—Ohio Valley Electric Ry.:

Properties sold, Details, 31.

Ι

Hinois Electric Railway Association:
—Annual meeting, Report, 478.
—Utilities cooperation discussed, 511. -- Utilities ecoperation diacussed, 511.

Illinois Power & Light Corporation (See Chicago, Ill.)

Illinois, State of:
-- Danville-Crawfordsville electric railway proposed, 642.
-- Gasoline tax unconstitutional, 416.
-- Utility education in public achools, 96.

Illinois Tracilon System (See Chicago, Ill.) Indiana Columbas & Eastern Traction Co. (See Springfield, Ohio).

Indianapolis, Ind.:

—Indianapolis, Ind.:

—Indianapolis & Cineinnati Traction Co.:
Bond case, Details, 520.
Equipment trust atock sale, 636.
Foreclosure, 678, 755, 839.
Reorganization, 257, 789, 842, 1093.
—Indianapolis Street Ry.:

Express railway-bus service suggested, 919.
Financial report, Bus, 918; 1092.
Safety posters, 334.
Skip-stop operation postponed, 957.
Transfers to buses installed, 746.
Valuation of bus company increased, 880.
—Interstate Public Service Co.:
Bond issue, 418.
Freight service expanded, 424.
New cars installed, Design, Detaila, *321.
—Terre Haute, Indianapolis & Eastern Traction Co.:
Financial report, 1053.

Co.:
Financial report, 1053.
Frankfort ordinance appealed, 555.
Interchanging systems, 514.
Merger plans, 596, 1012.
New schedule aought, 336.
Indiana Public Utilities Association:
—Annual meeting, Report, 952.
—Program for acquait meeting, 781.
—Reorganization, 369.
Follows, Sewiles, Conversition, (See Fort Indiana)

Indiana Service Corporation (See Fort Wayne, Ind.)

Indian, State of:

—Commission opponents seek office, 254.

—Public utility appraisal expenditures ruling, 632.

Inspection of cars:

—C. E. R. M. M. A. inspection rules. *24.

—Los Angeles, Cal., Methods, Detail [Jordan],
 *359.

*359.

Insurance, Fire:

—Des Moines, Iowa, Cost reduced, Details [Bernd], 583; Comments on, 569.

—Detroit, Mieh., Report on, 1006.

Insurance and pensions:

—Atlanta, Ga., Group insurance, 255.

—Chicago, Ill., Insurance increased, 173.

—Cleveland, Ohio, Details, *767.

—Gary, Ind., Insurance policies distributed, 256.

—Milwaukee Wis, Ruilding & Loan Assa, Re.

256.
—Milwaukee, Wis., Building & Loan Assn. Report, 274.
—Newark, N. J., Group insurance, 1047.
—Salt Lake City, Utah, Mutual Aid, 133.
—Wausau, Wis., Group insurance, 212.

Interburough Rapid Transit Co. (See New York City). Intercommunication system, London, 1007.

International Ry. (See Buffalo, N. Y.).
International Tramway, Local Rallway &
Motorbus Association (See Union Internationale de Tramways, etc.).

Interstate Public Service Co. (See Indianapolis, Ind.).

Interorban rallways:
—Advantages of riding on, 873.

Haly:

Overhead contact system, Three-phase, Details [Healy]. *317.

—San Marino to construct new railway, 416.

Track construction methods, Details [Blake], *535.

Turin, New earhouse and housing plans, 400.

Jackson, Mirh.:

—Michigan Electric Ry.:

Newspaper comments on service, 132.
Receiver appointed, 1090.
Reorganization plan, 961.
Service survey suggested, 132.

—Michigan R.R.:
Furniture transported, *297.

Jarkson, Tenn.:
—Jackson Railway & Light Co.:
Service records, 96.

Service records, 96.

Jacksonville, Fla.:

Jacksonville Traction Co.:

Car painting contest, *672, 747.

Experimental car painting, 710.

Franchise negotiations, 512, 633, 834, 673.

House organ increases size, 632.

Safety contest awards, 28.

Special cars engaged by merchants, 1046.

Jamaica Central Rys. (See New York City).

Jamalea Public Service Co. (See British West Indies). James II. McGraw Award: —Award won by W. Winans Freeman, 93.

Japan:

Osaka, New ears., •719.

Railway improvement plans for 1928, 883.

Railway improvements in 1927, 874.

Tokio opens first aubway, 337, 1087.

Tokio opens nrst suoway, or, sold Jollet, Ill.:

Chicago & Joliet Electric Ry.:

Dynsmic braking cuts heating costs, Details [Baumgarten], *648; Analysis [Wheeler], e905, e1074: [Baumgarten], e906; Comments on, 645.

Improvement plans for 1928, 223.

Joplin, Mo.:
—Southwest Missouri R.R.:
Fare increase, 29, 798.

Jugoslavia:
—Track construction methods [Manojlovitch],
•115.

K

Kansas City, Kans.:

—Home rule proposed for ears, 956.

—Kansas City, Leavenworth & Western Ry.:

New care, Detaila, Design. *355.

Kansas City, Kaw Valley & Western Ry. (See
Bonner Springs Kans.)

Kansas City, Lawrence & Topeka Electric Ry.

(See Lawrence, Kans.) Kansas City, Merriam & Shawnee R.R. (Sea Lawrence, Kans.) Kansas City, Merriam & Shawnee R.R. (Sea Lawrence, Kans.)

Kansas City, Mo.:

—Bus permit controversy, 634.

—Kansas City Public Service Co.:

Abandonment objected to by residents, 1007.

Bondholders suit. Hearing, 257.

Bonds issued, 259, 517.

Budget program, 139.

Bus franchise, 177, 631, 711, 747; Details, 875, 917; Comments on, 666, 846.

Bus patronage with 15-cent fare, 960.

Bus aervice increased, 136.

Car rehabilitation, Details, 4490.

Convention delegates handled with ease, 1045.

Fare increase, Bus, 875; Comments on, 846.

Fare situation, 479.

Financial report, 598, 755, 880.

Instruction panel explains treadle door operation (Weir], *1034.

One-man cars installed, 746.

Real estate association asks service extensions, 593.

Rehabilitation program for 1928, 642.

Safety record, 293.

Spray painting, Fireproof lacquer room [Weir], *1075.

Track maintenance methods, Details (Lavan), *447.

Viaduet construction, 372, *700.

Kentneky Truction & Terminal Co. (See Lexington, Ky.) Key System Tronsit Co. (See Oakland, Cal.)

Key System Transit Co. (See Carrain Knoxville, Tenn.: —Bus permit, Details, 875. —Knoxville Power & Light Co.: Bus controversy, 256, 875, 1049. Car orders, Specifications, *343. —Traffic aurvey, 590; Report, 836.

L

Labor (See also Employees):

—Detroit, Mich., Labor union contracts opposed, 131.

—Employment activity. 525.

—Employment shifts affect revenues, Comments on, 686.

—Employment situation [Klein], 602; Comments on, 489, 607.

—Industrial employment, 1925-27, *42.

—Interborough Rapid Transit labor controversy, 92, 331, 372, 416, 555; Comments on, 347.

—Mitten Management labor agreement, 553, 748; Comments on, 527.

—Track construction labor costs, *191.

—Unemployment investigation ordered by Senate, 1056.

—Unemployment report by Amalgamated, 371.

Lackawanna & Wyoming Valley R. R. (See Seraton, Pa.)

Lake Shore Electric Co. (See Cleveland, Ohio).

Lawrence, Kans.;

Lawrence, Kans.:

--Kansas City, Lawrence & Topeka Electric R.R. Reorganization plans, 302, 370, 420, 784; Comments on, 387.

--Kansas City, Merrism & Shawnee Electric Ry.: Bond issue, 680.

Officers and directors elected, 420.

Parade in bonor of restored service, 832.

Reorganization progress, 554.

Lehanon, Pa.:
—Laneaster, Ephrata & Lebanon Street Ry.:
Commutator slotting device [Albin], *119. READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Illustrated. c Communications.

Legal:

—Ambulance chasing, Commenta on, 308,

—Car door patent suit deciaion, 485,

—Hartford, Conn., Fare agreement decision, 514,

—Legal notes, 34, 220, 381, 600, 756, 923,

—Seattle, Wash., Purchase and bond ordinance auit appealed, 29, 255,

—Thermit patent case decision, 383,

- Thermit patent case decision, 383.

Legislation for rallways:

- Bill for federal regulation discussed, 832.

- Boston, Mass., Governor insists on legislaton for, 835, 1006, 1084.

- Boston, Mass., Public control bill, Progress, 26, 95, 171, 211, 293, 477, 515, 556, 783; Comments on, 1.

- Chicaso, Ill., Traction bills, Progress, 93, 131, 297, 331, 372, 414, 632, 783, 833, 871, 1086; Comments on, 528.

- Eastern Mass. St. Ry., public control bill, 783, - Lonisville, Ky., Bus franchise bill, 480.

- New Jorsey, Bus and railway coordination bill, 338, 559.

- New York, Indeterminate franchise law; Comments on, 605.

- New York, Unification legislation, Progress, 576, 414, 478, 515.

- Norfolk, Va., Fare bill recommended, 336.

Lehigh Valley Traction Co. (See Allentown, Pa.)

Pa.)
Lemoyne, Pa.:
—Valley Rys.:
Susquehanna Trail relief proposed, 133.
Traffic relief plans, 133.

Levis, Quebec, Cun.:

—Levis Tramways:

Weekly pass increases revenue. Details
[Weyman]. *901; Comments on, 885.

Lighting and lighting fixtures:

-Chicago, Ill., Lamps changed, 543.

-Hamilton, Ont., Shop illumination [Porter].

"1688. —New York. Westcheater & Boston cars [Smith], *235. —Osgood Bradley sample car, *1020. Lightning arrester testing set [Ruck], *652; Comments on, 647.

Lima, Ohio:
—Western Ohio Ry.:
Internrban ears rebuilt, Details, *695.

Interurban ears rebuilt, Details, *695.
Linroin, Neb.:

—Omaha, Lineoln & Beatrice Ry.:
Service abandoned, 521, 599, 714, 839.
Little Rock, Ark.:
—Arkansas Power & Light Co.:
Accident prevention campaign awards, 514.
Combating the automobile pick-up, 532.
Modernization, Results of, Details, *724.
Service men for holiday crawds, 133.
Shopping service men affect good will, 135.
Waiting station built, Details, *240.
Window display advertising, *212.
Louding natiforms:

Waiting station built, Details, *240.
Window display advertising, *212.

Loading platforms:
—Pittsburgh, Pa., Details, *234.

Locomotives, Electric;
—Battery-oil-electric, New York Central, Details, *530.
—France, High-power, for express service, Details, 323.
—German firm to construct, 644.
—Germany, Design, Details [Healy], *937.
—Highwood, Ill., Trolley-battery, Details [Brehobl, *393.
—Orders in 1927, *56; Comments on, 41.
—P. L. & M. Ry., France, 895.
—Red River Lumber Co., *727.
—Shipments of, 794.
—South Africa, Bids for, 566.
—South Bend, Ind., Details, *693.
—Spain orders Hungarian locomotives, 644.
—Switzerland, One-man, 1067.
—Tuscaloosa, Ala., Freight, *735.

London, England. (See Great Britain).

Long Island R.R. (See New York City).

Los Angeles Cal.:
—Rus free increase sought, 788.

London, England. (See Great Britain).

Long Island R.R. (See New York City).

Los Angeles Cal.:

—Bus fare increase sought, 788.

—Bus permit controversy, 338, 517, 711.

—Harbor Belt railway planned, 373, 835.

—Los Angeles Motor Coach Co.:

—Service changea, 836.

—Los Angeles Ry.:

Bus expansion in 1927, 215.

Bus expansion in 1927, 215.

Bus washing methods, *504.

—Fare increase denied, Details, 554, 672, 747.

—Financial report, 1052.

Hone bridge, Improved type, *734.

Manuals of operation and accounting [Jordan], *359.

—Trainmen commended by patrons, 254.

—Pacific Electric Ry.:

Beach property withdrawn from sale, 716.

Block-signals installed, 760.

Car improvements planned, 1016.

Educational program, *584.

Fare reductions, 630, 871, 1609.

Fare situation, 214.

Improvement expenditures in 1927, 174.

Monthly pass rate reduced, 1685.

Paper comments on bus competition, 709.

Physical examination of trainmen, [Weber], 1080.

Redlands abandonment petition withdrawn, 674.

Redlands abandonment petition withdrawn, 674.

San Fernando Valley railway planned, 373. Santa Ana bus permit, 1008. Viaduet construction completed, *10.

Viaduct construction completed, *10.
Loulsville, Ky.:
Airplane service plans, 1082.
Bus franchise ordinance, 253, 480, 558.
Louisville Ry.:
Anchored track crossings [Gleason], *473.
Brady Memorial presentation, *322; Comments on, 395.
Bus franchise purchased, 594; Details, 634; Comments on, 606.
Connelly award nominees to be selected, 28.

Louisville, Ky.:—Louisville, Ry. (Continued):
Financial reports, 921.
House organ issued, 873.
Jitneys banned, 1049.
Personnel changes, 342.
—Traffic survey under way, 956.

- Hande survey under way, soo.

Labrication:

- Brake rigging, Methods of [Thomas], *1036,

- Gear lubrication [Williams], *241.

- Motors, Oil-sealed housings for, Details

[Austry], *982.

- Oil handling practices, Details [Brewer],

*453.

Lynchburg, Va.:
—Railway property sold, 218.

Madison, Wis.:

—Madison Rys.:

Fare increase, 252,

Municipal ownership voted on, 298, 593,
Suit against officers settled, 513,
Valuation figures, 252, 557.

Valuation figures, 252, 557.

Maintenance data:
—Air compressor armature stand [Clegg], *664.
—Anchored crossings that will not drift with traffic [Gleason], *473.
—Attachment for lifting armatures quickly [Clegg], *825.
—Automatic shutters on blowers for air-cooled transformers [Schwegler], *824.

Automatic test for control jumpers [Bullock], -Better lubrication for old type motors [Hall].

-Brush-holders broached when worn [Herms], *476.

*476.

-Bus air reservoirs filled from shop air [Kraus], *989.

-Bus garage spring rack [Baine], *989.

-Bushings for carrying motor leads through frame [Hall], *286.

-Card records show condition of equipment [Kelly], *123.

-Centering truck for festing car axles [Taurman], *122.

man], *122.

—C.E.R.M.M.A. inspection rules and uniform charges, 21.*24.

—Clip tongs aid bus spring installation [Tipton], *661.

—Clutch plate facing jig [Herms], *990.

—Commutator wire-slot cleaning tools [Volence], *122.

—Compressed air vacuum cleaner [McClain], *987.

—Compression *bosmit fait.

*987.

Compromise thermit joints made without wax [McCartney]. *985.

Concrete ties effect saving [Botto]. *123.

Conditioning double track for concreting [Botto], *281.

Connecting rod for electric track switches [Gerhart]. *284.

Convenient and powerful spike puller [Mercier]. *124.

Convenient commutator neck slot cleaner [Clegg]. *986.

Convenient mounting for electric shovel truck [McCartney]. *474.

Convenient receptacle for switch irons

-Convenient receptacle for switch irons [Chiles], *282.
-Cutter for dust guard holes, *826.
-Device for straightening brake and door rods [Hall], *821.
-Die for making fruck swinglink bolts [Herms], *121.

Thermal, 121.

Tuble contact current measuring device
[Clegg]. *120.

-Efficient commutator slotting device [Albin], *119.

*119,

-Elevating truck for air compressors [Uhlich],
 *665.
-Fixture for boring journal bearings in a lathe
 [Carpenter], *663.
-Four-way tool post, *824.
-Grease fitting applied to motorman's brake
 valve [Hermsl, *666.
-Grease fittings for lubrication of ball bearing motors [Chiles], *663.
-Grease lubrication for trolley wheels [Brammer], *281.
-Gridding out acid corporation (Markin), *666.

meri, 231.

Grinding out rail corrugation [Martin], *286.

Gun iron used for brake drums [MacKay], *662.

Gutters reduce window cleaning [Bodoh], *988.

-Handy type of foot gong bracket [Lindsay],

—Improved adjustment for brake release spring [Morris]. *988.
—Improved pedestal tie bar extends across truck pedestal jaws [Chiles]. *474.

Truck pedestal jaws [Chiles], *474.

—Jig for testing bcnt axles [Hall], *822.

—Lifting armatures by pinion nut threads, *826.

—Machine for grinding heel recess in switch castings [McCallum], *285.

—Method of bringing out and fastening motor leads [Equipment Department], *124.

—Motor intake cover to keep out snow [Chiles], *825.

-825.

-Motor lead connection block [Hall]. *666.

-Oil heaters for thawing frozen switches [Fennell]. *283.

-Periodic testing of field coils reduces trouble [Tipton]. *121.

-Phosphor-bronze armature bearings profitable [Chiles]. *120.

-Press saves time in bearing removal [Duffly].

*119.

Maintenance data (Continued):

—Protection for cross bonding in concrete [Fennell], *822.

—Rails used in concrete tie construction [Botto], *986.

—Reclaiming ball type brake shoe hangers [McDowell], *473.

-Reinforced trucks require little maintenance [Chiles], *987.-Sectionalizing switch closed by haod lever, *823. -Sleeve

eeve prevents bending while installing shafts [Hall], *985.

shalls [Hall], *985.

—Split sleeve protects end of shalt while being pressed into wheel [Hall], *664.

—Staggered trolley hooks permit placing cars close together [Tipton], *823.

—Strengthening wheel construction for portable equipment [Buker], *662.

—Test equipment for door engines [Fanning], *283.

-Testing frame for track jacks [McCallum],

-Truck for handling lift jacks [Pollard]. *665.

-Valve regulator for pneumatically operated wire brush [Martin], *661.
-Wool-waste packed universal joints [Herms], *984

*284.

—Zerk fitting used for lubrication of brake valve [Pressler], *476.

Mainfenance equipment:

—Buses and trucks:
Automatic tire inflater (Yellow Jack-It),

*865,
Gas-electric bus (White), 367,
Light switch (Cutler-Hammer), *741.

Light switch (Cutler-Hammer), *741.

Car equipment:
Brake cylinder protector (Westinghouse Air Brake), *819.
Feed valve (Westinghouse Traction Brake), *507.
Foot and cut-off valves (Safety Car Devices), *703.
Reverser finger (Westinghouse), *126.
Sash with removable strips (O. M. Edwards), *367.
Splash lubrication device for car journals (Hinge), *408.
Warning horn (Westinghouse Air Brake), *587, 741.

-Carpenter shon.

-Carpenter shop:
Hand saw. Portable electric [Wodack],

*546.

General: neral: Blowpipe, Cutting type (Oxweld), *243, Blow torch (Prest-O-Lite), *289, Calculating machine (Burroughs), *546, Car washing machine, (Pittsburgh Rys.), *126.

Cutting and welding torch (Alex. Milburn).

*288. Flexible bolt (American Cable), *587. Gluepot. Portable electric (Black & Dec-ker). *703.

Hydraulic jack (Blackhawk), *546. Insulation tests by radio waves (Westinghouse), *668. Oxy-acetylene truck (Oxweld), *288.

-Line: Trolley frog, Duplex (Ohio Brass), *367.

-Machine shop:
Boring bars and cutters (Larkin Packer).

*327.
Chain for heavy lifting (Ford Chain).

*408. *408.
Chisel mortiser, Portable (Wallace), *946.
Die stocks, Adjustable (Borden), *909.
Grinder and drills (Hisey-Wolf), *946.
Grinder, Portable (Buckeye), *1077.
Grinder, Combination disk and floor (Hisey-Wolf), *408.
Lathe with multiple speed motor (Gallmeyer & Livingston), *408.
Manganese steel drill (Morse), 546.
Universal drill (Hisey-Wolf), *703.
Wrench for small spaces (Billings Spencer), 327.
aint shop:

-Paint shop Spray painting gun (Alexander Milburn), *587.

*587.

-Track and way:

Compression tamping machine (International), *776.

Lighting unit. Portable (Oxweld), 587.

Manganese crossing (Wm. Wharton), *628.

Mower, Gasoline engine (Rawls), *865.

Reciprocating grinder car (Railway Track-Work), *1037.

Spike-puller (Ingersoll-Rand), *546.

Tractor, Electric (Yale & Towne), *243.

Welder tractor (G. E.), *628.

Trucks: Light steel wheel (Dayton Steel), *243. Maintenance men's contest:

—Prize winners. *118, *280, *472, *660, *820, *991.

Roller Jouenal Bearings (Railway Motors), *1077.

Maintenance practice (See also Repair shop practice, and Repair shops and equipment).

—Atlanta, Ga., Methods, 804; [McAloney], *984; Comments on, 971.

—Boston, Mass., Maintenance code, 460,

—Brooklyn-Manhattan Transit Corp.;

Motor overhauling [Squier], *972,

Truck repair methods [Squier], *053, 729;

Comments on, 646, 723,

Wheel, gear and axle maintenance [Squier], *805,

—Buses and farake.

-805.

-Buses and trucks:

Air reservoirs filled from shop air [Kraus],
*089.

Brake test racks [Hettinger]. *740.

Bus garage spring rack [Baine], *989.

Clip tongs for spring installation [Tipton],
*661.

*661. Clutch plate facing jig [Herms], *990. Gasket rack, Book type [Herms], *1076. Gun iron for brake drums [MacKay], *662. Methods employed in New England, 328. Old buses utilized as work cars, *407. Portable dryer for painting, *702. Wash rack, Milwaukee, *326. Wheel aligning gage [Herms], *1035.

Wheel aligning gage [Herms], 1999,

-Car equipment:

Air brake equipment tests, *407.

Brake vslinder levers, Safety stop, *545,

Brake valve lubrication [Pressler], *476,

Brake valves cured from sticking [Graubner], *585,

Brush-holder parts alignment, *505,

Brush-holders, Details, *106; Comments on, 105,

Bushing for brake hangers [Pressler], *325.

Brus. on, 10 Bushing *325.

Cable leads, 20 things to avoid, 545.
Fare registers, Protection for, *586.
Fender maintenance, Comments on, 798.
Foot gong bracket [Lindsay], *475.
Lubricating brake rigging [Thomas], *1036.

*1036.

Modernizing maintenance methods [Persons], 1043.
Removing cab heaters [Hall], *701.
Sand hopper base support [Chiles], *946.
Test equipment for door engines [Fanning], *283.
Trolley hooks for car storage [Tipton], *823.
Trolley base tension rod for emergency, *544.

-Chicago Surface Lines, Car efficiency record, 350.

-Doors, Car:
Mechanism maintenance, Details [Freshe],

441.
**Control Oakley], 434.

Training men for [Oakley], 434.

—Ediforials on. General:
Cheap products make expense, 426.
Comparison of costs. 645.
Economizing by looking ahead, 266.
Expenditures for maintenance, 104.
Four dragons of maintenance, 103.
Supervision essential, 427.
Vibration a destructive agency, 103.

—Electrical shop:
Air compressor armature stand [Clegg],
*664.

Armature bearings, [Chiles], *120. Phosphor - bronze

temies], *120,
Armature jack, Hydraulic, *365,
Armature material rack, *408,
Armature rack, Portable, *776,
Armatures, Sling for dipping, *326,
Armature winding stand, Adjustable, *585,
Attachment for lifting armatures [Clegg],
*825,

Automatic shutters on transformer blowers [Schwegler], *824. Automatic test for control jumpers [Bullock), *285.

lock), *285.

Babbitted bearing armature stands, *863.

Bell box connections [Herms], *945.

Boring armature bearings in housings [Duffy], *626.

Brush-holder and broaching tool [Herms], *476.

Brush-holder tension measuring device, *1075.

Car controller maintenance [Beers], *465; Comments on, 427, Commutator neck slot cleaner [Clegg], *986.

Commutator slotting device [Albin], *119, Commutator wire slot cleaning tools [Volenec], *122.

Current measuring device [Clegg], *120. Cutter for dust guard holes. *826. Dipping tank, Portable, *406. Dynamometer set, Portable, *544. Field testing machine, Portable, *241. Insulated bushings for motor leads [Hall], *286.

Keeping motor fields in good condition [Chiles], 863. Leads on axle side reduce trouble [Chiles], 909.

Lifting armatures, Device for, *826.
Magnet valve gage [Beers], *325.
Motor cable leads, Details [Dean], *469.
Motor intake cover to keep out snow
[Chiles], *825.

[Uniles], *825.

Motor lead connection block [Hall], *666.

Motor lubrication [Hall], *475.

Motor rehabilitation, Details [Campbell], *800; Comments on, 798.

Portable welding outfit, *701.

Press for bearing removal [Duffy], *119.*

Rack for soldering irons, *506.

\$23.

Sleeve prevents hending with hand lever.

Sleeve prevents bending while Installing shafts [Hall], *985.

Malotenance practice:-Electrical shop (Conalatenance practice;—Electrical shop (Continued):

Testing equipment [Beers], *505, *544,
Testing of field coils [Tipton], *121,
Tool and material rack, Portable, *626,
Trolley pole rack, *739,
Truck for moving armatures, *702,
Welding rod holder, Ventilated, *366,
Wood commutator cover, *544,
Worn carbons or brush-holders affect commutation [Dean], *1076,
General: mutation (Dean), "1070.

mutation (Dean), "1070.

mercal:

Blacksmith forge heats babbitt, *864.

Car repair records [Kelly], *123.

C.E.R.M.M.A., Inspection rules and uniform charges, 21-*24.

Controller segments. Jig for, *366.

Coupling bar holders, *506.

Cylinder rack for storage, *627.

Elevating truck for air compressor [Uhlich], *665.

Equalizer bar bending form, *406, Gear lubrication, oil and grease [Williams], *241.

Grease fitting for motorman's brake valve [Herms], *666.

Grease fittings for ball bearing motors [Chiles], *663.

Grease lubrication for trolley wheels [Brammer], *231.

Guttera reduce window cleaning [Bodoh], *988.

Incinerator provides steam [Herms], *908. General: *988.
Incinerator provides steam [Herms], *908.
Numbering drawbars by welding, 864.
Receptacle for switch irons [Chiles], *282.
Safety lights in shop, *586.
Stand for washing window sash, *306.
Support for car ends in overhaul shop, *242.
Truck for handling lift lacks [Pollard] Truck for handling lift Jacks [Pollard], *665. Vacuum cleaner, Compressed air [McClain], Vacuum cleaner for car scats, 545.
Work bench with material racks, *863.
Wool - waste packed universal joints
(Herms), *284.

—General methods and practices, Details
[Squier], *428: Comments on, 425.

—Improved equipment reduces costs, Comments on, 969.

—Line: Line truck, General utility [Chiles], *775.
Polea butted with concrete, *365.
Wire reel, Adjustable, *945.

Machine shop:
Adjustable pit light [Williams], *1036.
Drill press adjustable stand, *326.
Drill press, Lever support and safety stop,

*586.
Everyway tool post, *884. *586.
Four-way tool post, *824.
Gas furnace, *992.
Hydraulic press constructed, *506.
Punch forms switch iron handles, 209.
Screw press for straightening bars rods, *908.
Stand for drill press, Portable, *909.
Swinging boom, *945. Minneapolis, Minn., General car repairs, *113. Motor inspection, Comments on, 970. New Orleans, La. [Kraus], *200; Comments on, 267. oil-sealed housings for motors, Details [Austry], *982,
-Paint shop:
Baking enamel uses, Minneapolis, Minn.,
*279. Lacquer apray room, Fireproof [Weir], *1075. *1075.

Power sander speeds car painting. *209,

—Pueblo, Colo., Methods. *231.

—Pull-ins:

Little Rock, Ark., Record, *724.

Records show maintenance methods, Comments on, 798. ments on, 798.

Track and way:
Anchored crossings [Gleason], *473.
Compromise thermit joints made without wax [McCartney], *985.
Concrete ties effect saving [Botto], *123.
Conditioning track for concreting [Botto], *281.
Connecting rod for track switches [Gerhart], *284.
Current collector for track tools, 739.
Electric shovel truck mounting [McCartney], *474.
Grinding heel recess in switch castings [McCallum], *285.
Grinding out rail corrugations [Martin], *286.
Manganese plates for rall joints, *209. *286. Manganese plates for rall joints, *209. Oil heaters for thawing frozen switches [Fennell], *283, 406. Protection for cross bonding [Fennell], *822. Rails used in concrete tie construction [Botto], *986. Spike puller [Mercier], *124. Strengthening wheel construction on portable equipment [Buker], *662. Testing frame for track jacks [McCallum], *821. Third-rail shoe support and tension device, *701.

Valve regulator for pneumatic wire brush [Martin], *661. Trucks:

Axle bearing flanges, Fiber for, *775.

B.-M. T. overhauling methods [Squier],
 *653, *729: Comments on, 646, 723,
Boring journal bearings, Fixture for [Carpenter], *663,

Brake apring release adjustment [Morris],
 *988.

Maintenance practice:—Trucks (Continued):
Jig for testing bent axles [Hall], *822.
Journal boxes, Chilling increases life, *585.
Making truck swing-link bolts [Herms],
*121.
Pedestal tic bar improved [Chiles], *474,
Reclaiming ball type brake shoe hangers
[McDowell], *473.
Reinforced trucks [Chiles], *987.
Split sleeve for pressing on wheels [Hall],
*664.
Straightening brake and door rods [Hall]. Straightening brake and door rods [Hall], *821. -521. Testing car axles [Taurman], *122. Tie bar for pedestal jaws [Chiles], *740. Truck for handling wheels and ax [Kelly], *1035. Management:

Detroit, Mich., Mayor outlines plan, 132.

Employee participation, P.R.T., 362.

Georgia Power Co., Policy, Comments on, 1.

Highwood, Ill., Rules for executives, Details, 735: Comments on, 721.

Philadelphia, Pa., Public relations dept., Details [Davies], *696: Comments on, 685.

Public relations effected by, Comments on, 487.

Public utility course in Harvard for business -Public utility course in Harvard for business executives, 134. -Readjustments to meet modern conditions [Mclhrath], 1031; Comments on, 1059. -Readjustments to meet modern conditions [McIlraith], 1031; Comments on, 1059.

Map displays improve service, 540.

Market conditions:

-American Brake Shoe to control National Bearing, 719.

-Austin Company activities, 565.

-Basking and credit conference, 1014.

-British traction contracts, 336.

-Business conditions [Klein], 602; Comments on, 607.

-Business conditions [Klein], 602; Comments on, 606.

-Business conditions [Klein], 602; Comments on, 606.

-Business outlook, 1928, 1014.

-Car door patent suit decision, 485.

-Cincinnati Car Co., Annual report, 344.

-Construction and contracting firms merge, 142.

-Consumer production of gases, 795.

-Davis Boring Tool Co. sold, 485.

-Distribution system, Comments on, 722.

-Economic currents to be studied, 223, 306.

-Economy Fuse buys Federal National, 1055.

-Electrical glossary published, 796.

-Electrical glossary published, 796.

-Electric locomotive shipments, 794.

-Employment activity, 525.

-Fare box orders, 423.

-Foreign trade combinations, 794.

-General Electric orders, 143, 683.

-Gernal Electric orders, 143, 683.

-General Electric orders, 143, 683.

-Gondorders Root snow scrapers, 604.

-Hyatt Roller Bearing publishes booklet, 344, lencandescent, lamp sales, 1927, 183.

-Index numbers of electric railway construction costs, *191.

-J. G. Brill Co. annual report, 264.

-Leather slogan prize offer, 38.

-Manufacturing conditions, 1927, Statistics, *85; Comments on, 105.

-Material handling conference, 1055.

-Material handling conf Map displays improve service, 540. — Motor division of General Electric created, 263.

— National Foreign Trade Convention, 643.

— N.E.M.A. elects new officers, 1055.

— N.E.M.A. indorses business code, 683.

— North Central States, outlook, 223.

— Presidential year outlook, Comments on, 489.

— Price-cutting, Effect of (Whitehorne), 304, 524, 967; Comments on, 387, 529.

— Price cutting, Manufacturer's talk of, 925.

— Proper prices of general interest, 1014.

— Railway industry outlook for 1928, *85; Comments on, 105.

— Roller Bearing Co. buys Mercer plant, 759.

— Rubber Institute organized, 883.

— Standard coal contract form revised, 843.

— Steel, Improved facilities in Miami Valley, 1095.

— Thermit patent case decision, 383.

— Tie requirements will decline, 925.

— Tire prices cut, 1016.

— Treadle door sales, 384.

— Westinghouse Air Brake Co, report, 423.

— Westinghouse Air Brake Co, report, 423.

— Westinghouse Air Brake Co, report, 423.

— Westinghouse report, 842.

— Wrought iron manufacturers form association, 719.

— Yellow financial report, Details, 383,

Market Street Ry, (See San Francisco, Cal.) Market Street Ry. (See San Francisco, Cal.)
Maryland Utilitles Association:
—Utility problems discussed, 547. Massachusetts, State of:
—Governor's annual message emphasizes tran-alt, 213. -Railways on legal investment list, 1090. McAlester, Okla.:

—Pittsburgh County Ry.:

Employees organize to popularize service,
288. McGraw Award (See James H. McGraw Award). McGraw-Hill Publishing Company and A. W. Shaw Company consolidate, 1084; Comments on, 1057,

Merchandising transportation (Continued):
—Cincinnati, Obio, Prizes for suggestions on, 746.

—Columbus. Ohio, Sample case 10.
tion. *770.

—Highwood Ill. Service improvement program,
Rules, 735; Comments on, 721. Mules, 735; Comments on, 721.

-Manufacturing transportation that will sell [Buckland], 541.

-Methods used in selling rides [Jackson], 830.

-New England Street Railway Club discusses, 328. -Route signs, Comments on, 723, -St. Louis, Mo., Service improvements, 29, -Selling rides on low cost basis [Jordan], *319, -Selling service [Weyman], 995. Michigan City, Ind.:

—Chicago, South Shore & South Bend R.R.:
Education films supplied, 28.
Freight service and equipment, Details,

*693.
Motor freight service installed, South Bend,

216. Service improvements, 748. Station completed in South Bead, 223. Track reconstruction, Progress, 1014. Statio: Track Michigan R.R.: (See Jackson, Mich.) Midwest Electric Railway Association:
—Annual meeting, Program, 866; Report, 950.
—Winter meeting, Report, 128. Milford, Mass.: Bus controversy, 594.

Bus controversy, 594.

Milford & Uxbridge Street Ry.:
Foreclosure, 380.
Reorganization, 838. Reorganization, 838.

Milwaukee, Wis.:

Milwaukee Electric Railway & Light Co.:

Building and Loan Assn., 1927 report, 274.
Dining car service installed, 134.

Dynamometer set, Portable, *544.
Financial reports, 300, 716.

Milwaukee Northern Ry. merger, 961.

New cars installed, 142.

Old buses utilized as work cars, *407.

Practice track and road for Instructing trainmen, Details *1065; Comments on, 1059.

Band transit improvements 212. Rapid transit improvements, 212.
Route guide issued, 394.
Service improvement and expansions planned, Details [Gordon], *310, *351; Comments cn, 307.
Stock exchange urged, 880.
Subway construction planned, 411.
Track construction program, 958.
Wash rack for buses, 326. Wash rack for buses, 326.

Minneapolls, Minn.:

Minneapolls, Street Ry.:

Budget for 1928.

St. Paul City Ry.:

Bus amendment proposed, 175, 559.

Fare hearings, 96.

Paving amendments defeated, 512, 671.

Valuation report, 219. Valuation report, 219.

Twin City Rapid Transit Co.:

Annual meeting of stockholders, 98.
Baking enamel, Uses of, *279.
Car repair practice, Details, *113.
Cars ordered, 883.
Christmas greeting in ad, 28.
New cars installed, Design, Details, *565.
Power sander speeds car painting, *209.

Washing sash, Stand for, *366. Missourl Association of Public Utilities:
—Annual meeting, 744. Mobile, Ala.:

—Mobile Light & Railroad Co.:

Paving and fare orders, 28.

Monongabela - West Penn Public Service Co.

(See Fairmont, W. Va.) Montreal, Can.:

Montreal Tramways:
Foot gong bracket [Lindsay], *475.
Halfway stops abolished, 1007.
Spike puller [Mercier], *124.
Stock offerings, 920.
Ticket fund, 483, 713; Comments on, 488,
Track improvement plants, 1095. Morristown, N. J.;

—Morris County Traction Co.;

Bus line sold to Public Service Ry., 337.

Bus substitution, 97, 256.

Foreclosure sale, 481.

Tax payments, 597.

Motion pictures of railway operation:

—Educational films supplied by South Shore line, 28. Mntor bus, Design;
—Altoona, Pa., *408.
—Atlanta, Ga., Single-deck bus, Details, *324;
Comments on, 309.
—Atlantic City, N. J., *577.
—Buses ordered by railways in 1927, *63; Comments on, 40 ments on, 40

—European report on. *947.

—Europe, One-man, Details [de Ribes], *704;
[Bacqueyrisse], *910; Comments on, 887.

—Milwaukee, Wis., Details [Gordon], *351.

—Third Ave. Ry. new buses, *719.

—Toronto, Can., *642.

Motor hus, Gas-electric;

—White and G. E. bus, New type, 367. Motor bus, Installation;
—Alameda, Cal., 516,
—Atchison, Kans., 837.
—Batavia, N. Y., 176.
—Beira, Portugese East Africa, 416.
—Belmar-Manasquan, N. J., 919.
—Bergen, Norway, 874.
—Berkeley, Cal., 749.
—Cedar Rapids-Waterloo, Iowa, 959.
—Chattanooga, Tenn., 299, 376.

Mator bus, Installation (Continued):

—Columbia. S. C., 632.
—Denver, Colo., 919.
—Evasosville, Ind., 516.
—Glens Falls, N. Y., 712.
—Groton, Conn.—Westerly, R. I., 1008.
—Hopewell, Va., 480.
—Johnstown, Pa., 712.
—Keckulk, Iowa, 750.
—Kingston, British West Indies, 595.
—Knoxville. Tenn., Controversy, 256.
—Lincoln, Ill., 1090.
—Marinette-Menominee, Mich., 675.
—Morristown, N. J., 97, 256.
—Morristown, N. J., 97, 256.
—Neenah-Kaukauna, Wis., 1008.
—Norton, Attlebora & Taunton St. Ry., 749.
—Pasadena, Cal., 960.
—Quincy, Ill., 417, 034.
—St. Joseph, Mo., 836, 1089.
—San Diego, Cal., 216.
—San Leandro, Cal., 788.
—Savannah, Ga., 216.
—Westerville, Ohio, 837.
—West Riding, England, 593.
—White Plains-Harrison, N. Y., 749.
—Winthrop, Mass., 517.
Mntor bus, Jiney competition:
—Columbia, S. C., 375; Comments on, 346.
—Detroit, Mich., 370; Decrease, *862.
—Louisville, Ky., Ordinance bars jitneys, 1049.
—Oklahoma City, Okla., Controversy, 256.

Motor bus, Operating practice:
—Albany, N. Y., Consolidation rumors, 559.
—Atlantic City, N. J., Details, *577.
—Bus maintenance standards; Comments on, 646.
—Bus operation by electric railways, Statistics, *63; Comments on, 40. National Safety Council:

—Consultant on electric railway safety proposed, 253.

—Magazine issued for employees, 708. on's Traffic, Traffic relief suggestions, Award for, 1048. Award for, 1048.

Newark, N. J.:

—Public Service Coordinated Transit:

Bus service extensions, 749, 1008.

De luxe bus service installed, *712.

Taxi purchase planned, 918.

—Public Service Corporation;

Anniversary celebration, Details, *914, 956;

Comments on, 928.

Budget for 1928, 174.

Christmas decorations, *131.

Fluancial report, 597; Comments nn, 568.

Morristown bus line purchased, 337.

—Public Service Ry.:

Cars redecorated, 423.

Christmas decorations, *131.

Group insurance, 1047.

Merger with bus company, Details, 98, 217.

No-accident bonuses awarded, *94.

Stock transfer, 138.

Welfare work, 412.

—Terminal construction plans, 784.

New Brighton, Pa.: New Brighton, Pa.:

-Beaver Valley Traction Co.:

Car cleaning machine, Details, *126.

Car order, Details, *102. Newburgh, N. Y.:

—Newburgh Public Service Corporation:
Buses destoyed by fire. *595. New England Street Railway Club:

—Annual banquet, Report 868.

—March meeting Program, 409.

—Merchandising methods discussed, Details, 328. -Bus operation by electric railways, Statistics, *63; Comments on, 40.

-Canadian Association discusses, 993.

-Fares inadequate; Comments on, 308.

-Highwood, Ill., Bus service transferred to subsidiary, 1089.

-Los Angeles, Cal., Washing methods, Details, *504.

-Maintenance equipment; Comments on, 797.

-Milwaukee, Wis., Details [Gordon], *351.

-New England association formed, 128.

-Oklahoms City, Okla., Service improvements, 1049.

-Paris, France Inert was protects bus feed. -Modern equipment discussed, 550. —Modern equipment discussed, 550.

New Haven, Conn.:

Connecticut Co.:

Exhibit at Home Progress Exposition, 593.

Fare agreement with city, Discussion, 514.

Hartford express service, 592, 712.

Hartford increases but atx, 215.

Middleton property sold, 789.

One-man car service extensions sought, 747.

Portable dryer for bus painting, *762.

Strike vote, Situation, 1084.

Wage negatiations, 958, 1047.

Window wipers for cars, *994.

New, Fagland (Propreportation Co.) —Paris, France, Inert gas protects bus fuel [Blake], *395,
—Reading, Pa., Improvement plans, 595,
—Southwestern Association discussion, 777,
—Test block for engines, Details [Foote], *659, -New England Transportation Co.: Hartford-Springfield bus line bought, 380. — Less Grock for engines, Details [Foote], *659, Motor bus, Regulation;
—Bay City, Mich., 298.
—Berkeley, Cal., Bus ordinance, 337,
—Georgia commission regulation, 338, 375, 416, 675. Hartford-Springfield bus line bought, 380.

New Orleans, La.:

—New Orleans Public Service, Inc.:

Bus air reservairs filled from shop air [Kraus], *989.

Bus garage spring rack [Baine], *989.

Cars ordered, Details, 183, *263.

Elevating truck for air compressors [Uhlich], *605.

Instruction methods for trainmen [Murphy], 401.

Lightning arrester testing set [Ruck]. -Interstate bus bill in Congress, 559, 136, 299, 559, 594, 635, 676, 711, 837; Comments on, 086. on. 086.

—Interstate bus tax upheld, Conn.. 338.
—Minnesota, Vehicle law upheld, 075.
—Muncie, Ind., Federal Jurisdiction, 516.
—New York, Canada ruling, 789.
—New York, Safety regulations, 215.
—Ohio Commission ruling, 30,
—Oklahoma, Interstate buses, 712.
—Portland, Ore, Emergency ordinance, 30,
—Tennessee, Regulation requested, 417.
—Toledo, Ohio, Controversy, 176.
—Virginia, Debate on bus bill, 417.

Motors, Electric rallway:
—Atlanta, Ga., Details [McAloney], *984.
—B.-M. T., motor overhauling, Details [Squier], *972.
—British contracts for 336 Lightning arrester testing set [Ruck], *652; Comments on, 647.

Maintenance and repair Organization and practice [Kraus], 290; Comments on, 267. 267. Motor load testing, Details [Naquin], *814; Comments on, 797. —Bus and railway coordination blll, 338, 559.

—Rapid transit plans for Northern New Jersey.
631. Newport, R. I.:

—Newport Electric Corporation:

Buses sold to Newport & Providence Ry.,
749. *972.

British contracts for, 336.

Brush-holder maintenance, Details, *106;
Comments on, 105.

Cable leads, Maintenance methods, Details {Dean}, *469.

Effect of unsprung car weight on track wear, Tests, Berlin, *403.

Europe, Standardization discussed, *947.

Germany, For high speed line [Breslauer], *501. New York Central R.R.:

—Automatic test for control jumpers [Bullock],

*825. *825.

-Electricification plans, 787, 834.

-Gloversville, N. Y., railway seeks inclusion in system, 596.

-Grade crossing climination in New York City, Bill, 631. -High-speed, Advantages of [Storer], 244; Comments on, 227, -Inspection reduces repairs, Comments on, 970. -New York State Rys. sold, 1009; Comments on, 1019. Switching locomotive, Battery-oil-electric, Details, *530. 970.

—Load testing, Details [Naquin], •814; Comments on, 797.

—London Uoderground order for, 759,

—Oil-sealed housings for, Details [Austry],

•982. New York City:
—Allied Power & Light Co. organized, *785;
Comments on, 762. -Ambulance chasing investigation; Comments on, 308. —Philadelphia, Pa., Subway cars, *942, —Rehabilitation methods, Woodside, L. 1., [Csmpbell], *800; Comments on, 798. Motor Transport Division of steam railroads organized, 30. Brooklyn City R.R.:

Horse car presented to Henry Ford, *786:
Comments on, 762.
Offices moved, 834; Details, 977.
Personnel changes, *181.
Witness card tells of accident bonus plan, *543. organized, 30.

Munleipal operation:

—B.-M.T., City acquisition agreement, 301.

—Houston, Texas, Railway offered to city, 591.

—Lincoln, Ill., Railway offered to city, 598.

—Madison, Wis., Referendum for, 298, 593.

—New York City, Public ownership proposed, 335, 556, 677.

—St. Petersburg, Fla., Bus operation, 960.

—San Francisco, Cal., Comments on, 887,

—Santa Barbara, Cal., City asked to purchase, 520.

—Tacoma, Wash, Suggested, 214. —Brooklyn-Manhattan Transit Corp.: Air brake equipment tests, *407. Brush-holder tension measuring device, *1075. Car equipment maintenance [Persons], 1043, -Tacoma, Wash., Suggested, 214.

N

Nashville, Tenn.:

—Nashville Railway & Light Co.:
Improvement program, 423.
Safety radin broadcasting, *1047.
Veteran's banquet, 373. National Electric Light Association:
—Annual convention, Report, 957.

1043.
City acquisition agreement, 301.
City purchase negotiations, 677.
Cutter for dust guard boles, *826.
Financial report, 840.
Four-way tool post, *824.
Motor overhauling, Details [Squier], *972.
Offices moved, 834; Details, 977.
Short extension planned, 513.
Truck overhauling system, Details [Squier], *653; Comments on, 640.
Truck repair methods and equipment [Squier], *729; Comments on, 723.
Wheel, axle and gear maintenance [Squier], *865. Bus franchise situation, 674, 1968.
Commuter census; Comments on, 309,
Comptroller submits fare plan, 172.

[Vol. 71 New York City (Continued):

—Decentralization to relieve congestion; Comments on, 799.

—Dry Dock, Broadway & Battery R. R.:
Fare increase sought, 1085.

—Eighth & Ninth Avenues Ry.:
Bus substitution sought, 918.

—Flushing rapid transit line opened. *173.

—Grade crossing elimination bill, 631.

—Indeterminate franchise legislation; Commentation, 605.

—Interborough Rapid Transit Co.:
Car door patent suit, Decision, 37, 485.
City claim against, 96.
City plans to recover, 556.
Fare controversy, 211, 252, 296, 333, 373, 412, 477, 514. *591, 745, 869, 954.*
Comments on, 187, 225, 226, 502.
Financial report, 380, 1050.
Labor controversy, 92, 331, 410, 555.
Lengthening of local platforms ordered, 94.
Strike talk revived, 372; Comments on, 347.

—Jamaica Central Rys.:
Numbering drawbars by welding, *864.
Swinging boom for shop use, *945.
Welding outfit, Portable, *761.

—Long Island R.R.:
Accident in Sunnyside, 556.
Grade crossing climination ordered, 682.

—Manhattan & Queens Traction Co.:
Blacksmith forge heats babbit, *864.
Portable stand for drill press, *969.

—New York & Harlem R.R.:
Cylinder, storage racks, *627.
Fiber for axle bearing flanges, *775.
Haod truck to transport wheels, *864.
Keyed pin for coil spring support, *739.
Protecting fare registers, *586.
Straightening bars and rods, *908.
Third-rail shoe support and tension device, *701.

Wood commutator cover Improved, *544.
Work bench with material racks, *863.

—New York & Loog Island Traction Co.: Third-rail shoe support and tension device,

*701.

Wood commutator cover Improved, *544.

Work bench with material racks, *863.

-New York & Loog Island Traction Co.:

Foreclosure proceedings, 521.

-New York & Queens County Ry.:

Brake cylinder levers, Safety stop, *545.

Bus franchise sought, 594.

Controller segment jig, *366.

Drill press adjustable stand, *326.

Equalizer bar benoing form, *406.

Lever support and safety stop for drill press, *580.

Motor rehabilitation, Details [Campbell], *800; Comments on, 798.

Rack for soldering irons, *566.

Sand csr, Equipment, Details, *651.

-New York Rys.: Sand csr, Equipment, Details, *651.

New York Rys.:
Financial report, 1612.

New York Rapid Transit Co.:
Car order, Details, *37.

New York Westchester & Boston Ry.:
Babbited bearing armature stands, *863.
Lifting armature, Device for *826.

New cars, Design, Details [Smith], *235, *683.

Passenger traffic 6 months, 30.

Wire reel, Adjustable, *946.

One-man car hearings, 334.

Safety devices for cars, Installation ordered, 1095.

Second Avenue R.R.:
Foreclosure rescinded, 840.

Stagger system tried, Results, 174.

Staten Island bus permit hearing, 99, 416, 635.

Steel bids for subwsy work, 526. -Staten Island bus permit hearing, 99, 416, 635.

-Steel bids for subway work, 526.
-Suburban bus activities, 956.
-Suburban transit plan, Report, 255.
-Subway construction bonds approved, 172.
-Third Avenue Ry.:

Brush-holder parts alignment, *505.
Bus fares increased, Westchester, 176.
Bus operations, Extent of, 919.
Bus petitions, New Rochelle, N. Y., 960.
New buses delivered, *719.
Radio Broadcasting relinquished, 1086;
Comments on, 1017.
Weather bureau sids snow fighting, 861.
-Transit plan proposed, 335, 515.
-Transit plan proposed, 335, 515.
-Transit policy, Newspaper advocates changs, 1005.
-Transit survey by Port Authority vetoed by Governor, 676; Comments on, 646.
-Unification plan, 1005.
New York Electric Rallway Association:
-Annual meeting:
Prigram, 951,
Report, Details, 1000.
-Mid-winter meeting, Report, 205. Mid-winter meeting, Report, 205.
 New York, New Haven & Hartford R.R.;
 Financial progress outlined, 99.
 Financial report of subsidiaries, 839. New York, State of:

—Bus extension bill, 376.

—Home rule and buses discussed by Governor, 26.

-Legislative committees membership announced, 93.

- Co.

- Paving relief bill, 133, 512.

- Railway unification bill, 478.

- Savings bank investment bill, 517; Comments on, 488.

- Terminable permit law, 555; Comments on, 605.

—Transit bill defeated, 515, —Utility bonds recommended by Legislaturs, 301,

-Unification legislation, Progress, 414. New York State Rys. (See Rochester, N. Y.)

New York State Rys. (See Rochester, N. Y.)
Noise reduction:
—Green Bay, Wis., Remodeled cars [Bodoh],
*275.
—Pittsburgh, Pa., Experimental cars [Gordon].
*888; Comments on, 885.
—San Francisco, Cal., Rubber used on cars, 358.
—Use of welding in car construction reduces
noise, 932.

Northern Ohlo Power & Light Co. (see Akron, Ohio):

Northern Texas Traction Co. (See Fort Worth, Texas).

Northwestern Pacific R.R.:
—Improvement program, 604.

Norwich, Conn.:
—Groton & Stonington Traction Co.:
New interests acquire stock and bonds, 179.

0

Oakland, Cal .:

Akland, Cal.:

-Key System Transit Co.:
Accident inquiry, Decision, 515.
Alameda bus service plaus, 516.
Bus extension, 338, 711.
Fare hearings, 171, 412, 558: Decision, 1003; Comments on, 929.
Fare increase, Ferrics, 917; Commuters, 1093.
Ferry accident, 222, 707.

Ferry accident, 333, 707.
Personnel changes, 920.
Sectionalizing switch closed by hand lever, *823. Service restored in Alameda, 335.

-San Francisco-Sacramento R.R.: Fare increase sought, 1006.

Ogdensburg, N. Y.:

Ogdensburg Street Ry.:
Paving charges settled, 633; Comments on, 605.

Ogden, Utah.:

—Utah-lidaho Central R.R.

Financial report, 717.

Weekly pass installed, 707.

Oil hnuse for Denver Tramway

*658. [Minister].

*658.

Oklahoma City, Okla.:

—Oklahoma Ry.:

Anniversary eclebrated, 332.

Belt line ordinance, 590.

Bond issue, 180.

Bus service improved, 1049.

Bus station opened, 959.

Freight line to be bullt, Details, 415.

Improvement program, Progress, 883.

Jitney contraversy, 256.

Personnel changes, 303.

Power plant sold, 922.

Recelvers discharged, 139.

Unified system advocated, 174.

Oklahoma, State of:

Railway and bus men cooperate, 136.

Olean, N. Y.:

Olean, N. Y.:

Olean, S. Y.:

Bus franchisc transfer sought, 97.

Defunct material taken over by city, 599.

Omaha, Lincoln & Beatrice Ry. (see Lincoln, Neb.):

Omaha, Neb.:

Omaha & Council Bluffs Street Ry.:

Bond extension agreement, 639.

Car wheel performance records, Details,

*816.

Commutator wire-slot cleaning tools [Volence], *122.

cnec], *122. Complaints and suggestions bureau established, 255, 601.

Fare increase in Council Bluffs, 93. Franchise negotiations, 785, 872, 1085. Improving public relations; Comments on, 307.

Service for packing houses, 332; Comments on, 307.

Service for packing houses, 332; Comments on, 307.
Skip stop service voted, 674.
Token fare increase songht, 513.
-Omaha & Southern Interurban Ry.:
Bridge reconstruction controversy, 133, 502.

502.
Track reconstruction controversy, 133.
—Traffic survey suggested, 672.
Operating records and cosis:
—Atlanta, Ga., Single vs. double-deck buses,
*324; Comments on, 309.

*324; Comments on. 309.

Atlanta, Ga., Maintenance costs reduced by new equipment [McAloney], *984; Comments on. 971.

Chicago, Car operating record, 112.

Cleveland, Ohlo, Aluminum car effects saving, *904.

Construction costs index, 1927 [Richey], *79.

Electrical operating costs, Switzerland, Details, *198.

-Gas-electric cars cut costs [Stinemetz], *575.

Joliet, Ill., Dynamic braking cuts heating costs [Baumgarten], *648; Commeuts on, 645; Analysis [Wheeler], c905, c1074, [Baumgarten], c906.

Little Rock, Ark., Detalls, *724.

-Princeton, W. Va., *579.

-Proper maintenance practices reduce costs [Squier], *428; Comments on, 425.

-Seattle, Wash., Five-cent loop operation, Results, *253.

-Substations, Rectifier and converter [Antoniono], *11; Comments on, 2.

-Trends of, Statistics, *42; Comments on, 39.

-United Shburban Ry., 553.

Ottawa Can.:

Ottawa Electric R.R.:

Fare increase sought, 175, 296, 872.

Financial report, 482.

Financial situation, 562.

Overhead contact system:

—Catensry and pantograph construction,
Europe [Healy], *8; Comments on, 3.

—Collector for track tools, *739,

—Germany, Construction for electrified operation [Healy], *937,

Overhead contact system (Continued):
—Italy, Three-phase, Details [Healy], *317.
—Maintenance methods, Details [Birch], *435.
—Trollcy wire failures, Analysis [Scott], *278.

Pacific Electric Ry. (See Los Angeles, Cal.)

Painting: Atlantic City, N. J., Metbods, *978. Baltimore, Md., Car color scheme adopted.

Atlantic City, N. J., Metboos, 1976.

Baltimore, Md., Car color scheme adopted.
464.

Green Bay, Wis., Remodeled car color scheme (Bodoh), *275.

Jacksonville, Fla., Prizes for color suggestions, *672, 710.

Minneapolis, Minn., Uses of baking enamel.
*279.

-Norfolk, Va., Open ears, 673, -Spray painting methods, Leipsic, Germany, *817. -Toronto, Can., Lacquer tests, 643. -Varnishing methods, Details [Jackson], *461; Comments on, 425,

Comments on, x25.

Parking of cars:

—Baltimore, Md., Studies Chicago law, 134.

—Chicago, Ill., Ordinance:
27, 92, 172, 298, 332, Details [Mc-llraitb], *188; [Lockel, 548, 621; Com-llraitb], *188; [Lockel, 548, 621; Com-

ilraitb], *188; [Locke], 548, 621; Comments on, 185.

—Cleveland, Ohio, No-parking ordinance refused, 748.

—Detroit, Mich., Survey, Details, *570, *617; Comments on, 605.

—Development of suburban business because of parking, Comments on, 386, —Parking discussion (Simpson), 1039.

—Philadclphia, Pa., Parking areas popular, 297, 955.

—Patents, Car door, Infringement suit, Interpatents, Car door, Infringement suit, Inter-

Patents, Car door, Infringement suit, Inter-borough, 37.

Pavements:

—Berlin, N. H., Paving methods (Noyes),

-Detroit, Mich., Paving schedule, 174. -Paving relief (See Taxes): -Pontiac, Mich., Paving methods, *581. -Vitrified paving brick sizes approved, 682.

Pennsylvania-Ohio Electric Co. (See Youngstown, Ohio).

Pennsylvania R.R.:
—Train-airplane service, Comments on, 845. Pennsylvania, State of:
—Accident report for 1927, 414.

Peoples Ry. (Sce Dayton, Ohio).

Peoples Ry. (See Dayton, Onio).

Philadelptia, Pa.:

—Loan bills to be voted on, 336.

—Mitten Bank dividends, 302.

—Mitten Plan published in New York City,
411; Comments on, 385.

—Philadelphia Rapid Transit Co.;

Articulation with Reading lices suggested,
591.

591.
Bus competition with Reading R.R., 1008.
Bus fares reduced, 788.
Bus purchase, Approval sought, 594.
Bus terminal planned, 256.
Capital stock increase, 521, 680.
Corporate simplification, 1010, 1050; Comments on, 1018.
Employees participation, 362; In earnings, 1927, 212.

1927, 212.

Fare controversy, 915; Decision, 1085, Financial report, 418, Labor agreement, Details, 553, 748; Comments on, 527.

Mayor plans to condemn subsidiaries, 560, New directors elected, 522, Parking areas popular, 297, 955, Preferred stock issue, 257, 1052, Prize for safety slogans, 787.

Public relations department, Details, 1Davies], *696; Comments on, 685, Safety drive reduces accidents, Details, *896; Comments on, 886, Safety record, 1927, 335, Stock increase proposed, 878.

Subway cars, Electrical equipment for, *942, Surface-car subway ordinance, 252, 590,

Surface-car subway ordinance, 252, 590, 916. Taxicab maintenance program, 497. Taxicab purchase negotiations, 136, 481.

-Station control contract for Broad Street subway, 566.

subway, 566,

—Taxi cruising regulation, 479,

—Transit plans, 28, 214,

—Transit report, 480,

Philippine Islands:
—Manila Electric Co.:
Trolley buses installed, Details,
Comments on, 527. *391:

Phoenix, Ariz.:

—Phoenix Ry.:

Bond issue upheld, 378.

Rehabilitation plaus, 255.

Pledmont & Northern Ry. (See Charlotte, N. C.)

Pittsburgh, Pa.:

--Monongahela Street Ry.:

Bond increase sought, 789.

-Pittsburgh, Harmony, Butler & New Castle Ry.: Manganese plates for rail joints. *209, Poles butted with concrete, *365, Tieless track construction, Details, *277.

-Pittsburgh Rys.: Advertising literature, Details, *539, Block-signal system installed, 968, Bucket type seats on interurban cars, *773.

Pittsburgh, Pa.:
—Pittsburgh Rys. (Continued):
Compromise thermit joints made without
wax [McCartney], *985.
Culvert construction, Details [Sumner],
*856.

De luxe bus service extended, 788; Comments on, 971.

Electric shovel truck mounting [McCartney], *474.

Experimental cars, Details [Gordon], *888; Comments on, 885.

Financial reports, 678; Comments on, 971. Grinding out rail corrugations [Martin], *286. Homestead & Mifflin Street Ry, purchased, 638.

Newspaper sells passes with ad insertions, 255.

Radio program, *633.
Safety campaigo, Work of, Details, *234.
Valve regulator for pneumatic wire brush [Martin], *661.
Wage agreement, 708.

-Traffic vehicle count, *320; Comments on, 345,

-West Penn Rys.: Insulated bushings for motor leads [Hall], *286. *286. Motor lead connection block [Hall], *666. Motor lubrication [Hall], *475. New directors elected, 258. Removing cab heaters [Hall], *701. Straightening brake and door rods [Hall], *821.

Poland:
—New electric railroad completed, 336,

Port Arthur, Texas:

Port Arthur, Traction Co.:

New fare schedule, 252.

Public auction sale, 138.

Railway—bus service installed, 832.

Hanway—on House & Light Co.:

—Cumberland County Power & Light Co.:

Abandonment hearings, 482: Decision, 1008.
General utility line truck [Chiles], *775,
Insull interests negotiating for, 599.
Keeping motor fields in good condition
[Chiles], 863.

Lubricating armature bearings [Chiles], *663.

Motor leads on axle side reduce trouble [Chiles], *908. Motor intake cover to keep out snow [Chiles], *825.

Pedestal tic bar improved [Chiles], Phosphor - bronze armature [Chiles], *120. bearings

Receptacle for switch irons [Chiles], *282, Reinforced trucks require little maintenance [Chiles], *987.

Sand hopper base support [Chiles], *946. Schedule reduced, 679. Tie bar for pedestal jaws [Chiles], *740.

Portland R.R.: Financial report, 1012.

Financial report, 1012.

Portland. Ore.:

—Emergency bus regulation ordinance, 30.

—Portland Electric Power Co.:

Employees' Twenty Year Club, 256,

Folder form advertising, 873.

Free rides furnished by C. of C., 670.

Library increased, 1046.

Northwestern Electric merger, 378.

Pottsville, Pa.:

—East Penn Electric Co.:

Wage agreement strike, 92, 135, 375.

Ponghkeepsie, N. Y.:

—Poughkeepsie & Wappinger Falls Ry.:

Abandonment hearing, 872.

Fare schedule changed, 298.

Purchase offer, 711.

Right-of-way offered for sale, 95.

Power conservation:
—Little Rock, Ark., Economies with one-man cars, *724.

Power distribution:

—Altoona, Pa., Improvements in, *498.

—Boston & Maine R.R., Contracts for, 514.

—Cincinnati, Ohio, Details [Swift], *117, 688.

—Electrified railroads, Europe [Healy], *8;

Comments on, 3.

Comments on, 3.

German electrified lines [Healy], *937.

Havana. Cuba. Details [Whitlow], *348.

Litaly, Three-phase a.c. system [Healy], *5

Logsing railroad, Details, *727.

Midi Ry., France, *622.

Milwaukee, Wis., Details [Gordon], *310.

New York West theory. 37. *348. *317.

-New ew York. Westchester & Boston R.R., Details [Smith], *325.

—Providence, R. I., Interchange of power, 175, Power generation: —Oklahoma Ry, sells power plant, 922. —Vancouver, B. C., Power plant, 464.

Power rate charges reduced, Dallas, Texas, 680.

Power stations and equipment:
—Vancouver, B. C., Power plant, 464.

—Vancouver, B. C., Power plant, 464.
Power transmission:
—Havana. Cuba, Details [Whitlow], *348.
—New York, Westchester & Boston R.R., Details [Smith], *235.
—Providence. R. I., Frequency changer installed, 818.
Prescott, Dlck, *127, *289, *668, *819, *992.
Princeton, W. Va.:
—Princeton Power Co.:
Operating record, *579,
Railway and lighting properties separated, 920.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Iliustrated. c Communications. Abbreviations:

opened, 337.

Providence, R. I.:

—United Electric Rys.:
Accident card, 1927, 332.
Bus substitution denied, 97.
Employees buy stock, 259.
Freight abandonment briefs filed, 254.
Frequency changer installed, 818.
Personnel changes, 717.
Power interchange arranged, 175.
Transfer interchange, bus and cars, 375.
Psychological tests for employees, Comments on, 762.
Publicity: (See also Advertising). Railways (Continued):

—Readjustment of methods necessary [Mc-Ilraith], 1031; Comments on, 1059,

—Regulation of, Details [Dillavou], 495; Comments on, 527.

—Review of events, 1927 [MacMurray], *737,

—Social and economic life affected by, 878.

—Spain completes new railway, 874.

—Traffic, 1are and wase figures, A.E.R.A. report, 98, 576, 677, 755, 840, 964.

—Year's progress, Comments on, 39. Public, Relation with (Continued):
-Lansing, Mich., Service survey suggested. -Lansing 132. -Little Rock, Ark., Shopping service increases good will. 133. -Richmond. Va.:
Free rides for shoppers, 175.
Legislators taken on bus tour, 480
Stock sale campaign, Details, *404. -St. Lonis, Mo., School children carried to see Lindbergh, 374. -- rears progress, Comments on, 39.

Rapid traosit:
-- Chicago, Ill., Subway construction plans, 478.
-- Cincinnati, Ohio, Situation, 478, 1005.
-- Cleveland, Ohio, Negotiations for subway, 413, 1046, 1083.
-- Flushing, N. Y., rapid transit line opened, 173.
-- Milwaphae, Wis Assertion on, 762.

Publicity: (See also Advertising):
—Atlanta, Ga., Car route sign in drug store,
*400.

Baltimore, Md.:
Progress parade, *954.
Railway to aid Red Cross, 412.
Street car directories distributed, 254.
—Baffalo, N. Y., Tokens as Christmas gifts,
298. St. Lonis, Mo.. Voting on front or rear entrance cars, *862. -Sanford, Maine, Smoking to be voted on, 175, -Toronto. Caa., Newspaper comments on service, 512. 173.

—Milwankce, Wis., Improvements and expansion. Details, 212; [Gordon], *310; Comments on, 307.

—Milwankee, Wis., Subway construction plans, 411.

—Philadelphia, Pa., Plans for, 214, 336.

—Rochester, N. Y., Subway extension planned, 371.

—Subway plans for Palicades, \$35. Washington, D. C., Prize for radiator cap design, 788. -Wichita, Kans., Newspaper man urges bigher fare, 918. -Chicago, III., Safety movie, 862. -Chicago, III., Sightseeing and route guide issued, 336. Public Service Coordinated Transport. Newark, N, J.): Developing new business [Soulcs], 551; Comments on, 929. Public Service Corporation (See Newark, N. J.): —Subway plans for Palisades, 835. —Tokio, Japan, First subway o 1087. Public Service Ry. (See Newark, N. J.): ments on. 929.

Evansville, Ohio, Papers boom railway, 710.

Gary, Ind., Public guessing contest, 132.

Glens Falls, N. Y., Old cars burned, 1007,

Grand Rapids, Mich.:

Gene Tunney entertained, *413.

Trolley song popular, 335.

Houston, Texas, Christmas carol car, 27.

Lonisville, Ky., House organ issued, 873.

—Macon, Ga., Newspaper tells railway history, 673.

Man displays improve service, 540. Public service and regulative commissions:

—California Commission, Personnel changes, 101. Reading R.R.:

—Articulation with P.R.T. suggested, 591.

—Bus competition with P.R.T., 1008.

—Bus franchise, 675.

—Bus improvement plans, 595.

—Bus operating charter, 216.

—Electrification plans, 747. Commission cannot act in New York-Canada case, 789. -Congress asked to amend interstate com-merce act, 708. -Electric railway bill in Congress, Discussion, 832. Real estate:
—Suburban development of business areas,
Comments on, 386. — Map displays improve service, 540.

— Melbourne, Australia, Decorated tramway honors Duke, *355. —Georgia. Conrt ruling on Commission's powers, 675. Interstate bus hearings, 136, 299, 594, 635, 711, 837; Comments on, 686.
I.C.C. depreciation accounting hearings, 520.
I.C.C. hearings on Illinois Terminal case, 414. 299, 594, 635, Renn, Nev.:
—Railway suspension, Comments on, 147. honors Duke, *355.

—Mitwankee, Wis., Route guide issued, 394.

—Mitten Plan published in New York City, 411; Comments on, 385.

—Newark, N. J., Christmas decorations, *131.

—New Haven, Conn., Exhibit at Exposition, Repair shop practice (See Maintenance practice): —Ne —New 593. -Public utility hearings, Federal Com., Progress, 130, 558. Repair shops and equipments: -St. Lo., 371. B.-M. T. truck repair equipment [Squier],
 *729; Comments on, 723.
 Bus maintenance equipment, Comments on,
 797. Louis, Mo., Rapid transit commission bill, Ohio, Public utility textbook in schools, 787,
Oklahoma City, Okla., Anniversary celebration, 332.
Pittsburgh, Pa., Newspaper sells passes with ad insertions, 255. —Senate rejects J. J. Esch reappointment to I.C.C., 421, 514; Comments on, 528.

Public Service Transportation Cn. (See Newark, N. J.) 797.

—Chicago, Ill., Jigs and dies, Details, *271.

—Delaware, Ohio, Plans for, 486.

—Detroit, Mich., Details, *624.

—Hamilton, Ont., Details [Porter], *1068.

—Improper facilities increase maintenance costs, Comments on, 426.

—Improved equipment necessary, Comments on, 969. -Publicity man, Need for [Biery], 1006. -Rochester, N. Y., Newspaper published for patrons, 297. Public utility investigation by Senate, 130, 171, 333, 672, 872; Comments on, 307. -St. Louis, Mo.: Balloting for front or rear entrance cars, *862. Pueblo, Colo.:

—Pueblo Electric Ry.:

Rehabilitation methods, Details, *231. -Maintenance equipment design, Comments on, Insignia design prize awarded, *556. Puget Sound Power & Light Co. (See Seattle, Wash.) —San Francisco, Cal., Parade precedes abandonment, *254.
—San Francisco, Cal., Window displays, 710.
—Signs encourage riding, Comments on, 569.
—Springfield-Worcester, Mass., Old cars burned, *555. -Motor maintenance equipment, Woodside, N. Y. [Campbell], *800; Comments on, 798. Motor overhauling equipment. B.-M.T. [Squier], 972.
—Quebec, Can., Detalls, *388.
—Wheel, gear and axle maintenance equipment, B.-M. T. [Squier], *805.
—Worcester, Mass., Cars and bus repair equipment, Details, *848. *555.

-Wichita, Kans., Newspaper tells need for fare increase, 674.

-Youngstown, Ohio, Newspaper ads in booklet, 674. Quebec, Canada:
—Quebec Railway, Light, Heat & Power Co.:
Property sold to power company, 638,
Repair shop and equipment, Details, *388, Public, Relations with:
—Atlanta, Ga., Stores co-operate with railway.
*400. Reports Financial (See Financial reports). Richey conspectus of indexes, 179, 340, 520, 715, 879, 1051; Changes in, 1051. -Attendance at local meetings, Comments on, R -Angusta, Ga., Advertising prize awarded. 710.

-Baltimore, Md.:
Details, 293; Comments on, 267.
Information service, 96.
Patrons select car colors, 464.
Street guide issued, 371. —Cleveland, Ohio. Broadcasting, 515, *63
—Nashville, Tenn., Safety broadcasting, tails, *1047. Steet state Issued, 511.
Biddeford, Me., Patrons ask for fare increase, 130.
Buffalo, N. Y., Community development campaign, 835.
Clarksville, Tenn., Scheme to boost railway, 222. Pittsburgh, Pa., Broadcasting, 515, *633,
Providence, R. I., Broadcasting, 633.
Third Ave, Ry, relinquishes broadcasting, 1086; Comments on, 1017. Rail joints and bonds:
—Clamps for thermit welding, *116. 833. Customer-ownership plan. Comments on, 928.

Dallas, Texas, Courtesy campaign, 298.

Elmira, N. Y., Improvements in, 212.

El Paso, Tex., Free rides given by merchants 1006. nns; -Cologne, Germany, Details [Schwanter], *979, -Improvements in, Details [Noorbeeck], *912; Cooments on, 887, -Paris, Fraoce, Standard [Blake], *535, 1006.

Executives affect. Comments on, 487.

Gary, Ind., Weather bureau, 295.

Hartford, Conn., Express service for baseball faus, 592.

Jacksonville, Fla.:

House organ increases size, 632.

Special cars chartered by merchants, 1046.

London, England, Honse-to-house canvass, 336.

Los Angeles, Cal., Paper comments on bus competition, 709. Ra'lway construction proposed:
—Danville-Crawfordsville, Ill., electric railway proposed, 642, 683. -Esthonia. New railway constructed, 593. -Los Angeles, Cal., Harbor Belt Line planned, 373, 835. -San Fernandu, Cal., Railway planned, 373 -San Marino, Italy, Railway construction, 4 -Texas railway construction planned, 525, -Soudan starts construction, 1007.

715, 879, 1051; Changes in, 1051.

Richmood, Va.:

—Virginla Electric & Power Co.:

Advertising award, 332.

Bond issue, 596.

Bus service extended. 338.

Car colors changed, 95, 673.

Fare bill recommended, 336.

Free rides for shoppers, 175.

Improvements planned, 423,

Jig for testing bent axles [Hall], *822.

Legislators taken on bus tour, 480.

Red suits for track men reduce accidents, 297. Sleeve prevents bending while installing shafts [Hall], *985. Split sleeve for pressing on wheels [Hall], *664.

Stock and bond issue, 714. Stock sale campaign, Details, *404.

Roanoke, Va.:
—Properties sold, 218.
—Roanoke Railway & Electric Co.:
Fare reduction on buses denied, 749.

Fare reduction on obsess denied, 749.

Rochester, N. V.:

—New York State Rys.:

Bus substitution planned, 919.

Eric Canal line unfit for operation, 130.

Financial report, 99, 259.

Freight service subway contracts, 372.

Newspaper published for patrons, 297.

New wage contract sought, 590.

One-man car safety record, 373.

Property sold, 1009: Comments on, 1019.

Safety contest winners dined, 918.

Schedule changes and service improvements, 672.

Subway opening delayed by track faults, 130.

Subway passenger traffic, *213, 410.

130.
Subway passenger traffic, *213, 410.
Wage contract renewed, 834.
Subway extensions planned, 371.
Rockford, Ill.;
—Rockford-Freeport Ry. organized, 918.
—Rockford Public Service Co.;
Property sold, 714.

Rockland, Me.:
—Central Maine Power Co.:
Steel bridge constructed, Details, 403.

Rome, Ga.;

—Rome Railway & Light Co.;

Fare hearings, 917, 958,

Rome convention (See Union Internationale de Tramways, etc.);

ments on, 488.
Executive statements of 1927 operation, 47.
Expenditures placed for 1928, *45; Comments on, 41.
Financial outlook, 1927 reviewed, *70; Comments on, 40.
Future of [Stevens], 764; Comments on, 761.
Future of the troubled trolley, 592; Comments on, 567.
Governors report on, 213.
Importance of [Buckland], 541; [Storrs], 547; Comments on, 567.
Industry statistics, *42; Comments on, 39.
Liberty magazine street car articles, Comments on, 225.
Vational's Rusiness article on, 373. ments on, 307.

—Philadelphia, Pa., Public relations dept.,
Details [Davies], *696; Comments on,
685.

—Play square with the public [Shannahan],
998; Comments on, 1017.

—Portland, Ore., C. of C. gives free rides, 670,
Prizes for car color suggestions, 747.

Los Angeles, Cal., Trainmen commended by patrons, 254.
 McAlester, Okla., Employees boost service, 298.

— Michigan City, Ind., Free rides on Bargaln Day, 958.
 — Milwaukee, Wis.;
 Dining car service installed, 134.
 Service improvements planced, Details [Gordon], *310; Comments on, 307.

-Minneapolis, Minn., Christmas greetings in ad. 28. -Omaha, Nch., Complaint department, 255, 601. -Omaha, Neb., Improving service, 332; Comments on, 307.

-Nationa's Business, article on, 373. -Needs of railways (Woodward), 228. -Progress in 1927, Comments on, 39.

Railways:

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Iliustrated. c Communications.

Ballways:

Bus operations and purchases in 1927, *63;
Comments on. 40.

Community transportation [Draper], 780.

Economizing, Results, Comments on, 723.

Effect of open winter on carnings, Comments on, 488.

```
Sacramento, Cal.;

—Pacific Gas & Elec. Co.;

Fare hearings, 371.

Sufety work. (See also Accident prevention).

—Brady Safety medals awarded for 1926, 129.

—Chicago, Ill., First aid training, 738.

—Duluth, Minn., Safety Campaign, 300.

—El Paso, Texas, Details, *193.

—Houston, Texas, Safety bonus, 334.

—Indianapolis, Ind., Posters on cars, 334.

—Jacksonville, Fla., Safety contest awards, 28.

—Kansas City, Mo., Safety record, 293.

—National Safety Council issues magazine for employees, 708.

—Newark, N. J. No-accident bonuses, *94.

—New Haven, Conn., Window wipers installed, *904.

—New York, Bus regulations for safety, 215.

—Philadelphia, Pa., Safety slogans, 787.

—Pittsburgh, Pa., Campaign, Details, *234;

—Progress of [Eastham], 886.

—Rochester, N. Y., One-man car safety record, 373.

—Training for safety, Comments on, 569.
 373.

Training for safety, Comments on, 569.

Viaduct eliminates grade crossing, Los Angeles, Cal., *10.

Wichita, Kans., Cars painted red as safety measure, 1083.

Wilmington, N. C., Safety methods win Brady award, Details, 233.

—Youngstown, Ohio, Bus drivers' safety records, 256.
St. Joseph, Mo.:
—St. Joseph Ry. Light, Heat & Power Co.:
Bus ordinance, 836, 1089.
 St. Louis-Kansas City Short Line R.R.:
Opposition to construction filed by steam roads, 175.
Permit denied, 1048.
```

```
Permit denled, 1048.

St. Louls, Mo.:

—Bus extension opposed by railway, 337, 1049.

—Chicago-St, Louis bus service arranged, 1090.

—Parking ordinance, 135,

—Rapid transit commission bill, 371, 709.

—Rapid transit survey to be made, 834.

—St. Louis Public Service Co.:

Accident report, 405.

Bus extensions sought, 675.

Bus extensions sought, 675.

Bus aurvey, 517.

Chair car popular, *855.

Children transported to see Lindbergh, 374.

City Zone fares abolished, 917.

Company magazine, Cash award for name, 27, 214.

Dividend on preferred stock, 563.

Fare hearings, 131, 557, 630; Decision, 1082; Comments on, 1058.

Fare increase permit extended, 172.

Financial report, 99.

Holding company plan attacked, 258, Insignia design prize awarded, *556, Pass tickets for employees, 708.

Payenter fare system voted on, 412.

Preferred stock issue, 1050, Rerouting planned, 1009.

Service improvements, 29.

Skip stop system Installed, 633, Stock application, Bricf filed for dismissal, 301.

Sunday pass installed, 132.

Sunday pass installed, 132.
```

Sunday pass installed, 132.
Sunday pass sales, 414, 679,
Tax assessments, 302.
Trainmen's dressing rooms improved, 298.
Transfer privileges broadened, 745.
Valuation hearings, 380; Decision, 1082;
Comments on, 1058.
Voting on front or rear entrance ears,
*862. Wage increase sought, 134, Wage negotiations, 513, 710, 746, 786, 834, 871.

—Transportation survey bill, 630, 1045. —United Rys.: Judgment satisfied, 483. Receiver discharged, 961.

St. Paul City Ry. (See Minneapolis, Minn.)

St. Petersburg, Fla.:
—St. Petersburg Municipal Ry.:
Municipal bus operation, 960.

Municipal bus operation, 960.

Salt Lake City, Utah:

—Bamberger Electric R.R.:
Financial report, 1092.

—Salt Lake & Utah R.R.:
Financial report, 1012.

—Utah Light & Traction Co.:
Abandonments allowed 378, 964.
Mutual Ald Assn. profitable, 133.
Safety contest, 373.
Safety contest winners honored, *671.
Trolley bus application, 875.

Trolley bus application, 670.

San Antonio, Texas:
—San Autonio Public Service Co.;
Concrete ties effect saving [Botto], *123.
Conditioning track for concreting [Botto], *281.
Rails used in concrete tie construction [Botto], *986.
Service record, 1927, 336.
Two railways purchased, 178.

San Diego, Cal.:

—San Diego Electric Ry.:

Air compressor armature stand [Clegg],

*604. Attachment for lifting armatures [Clegg], *825. Polymer for initial armatures [Ciegg], *825. Bell box connections [Herms], *945. Brush-holders broached when [Herms], *476. Bus fares increased, 97. Bus substitutions, 216, 749. Bus wheel aligning gage [Herms], *1035. Clip tongs for bus spring installation [Tipton], *661.

San Diego, Cal.:

—San Diego Electric Ry. (Continued):

Clutch plate facing jig [Herms]. *990.
Convenient commutator neck slot cleaner [Clegg], *986.
Current measuring device [Clegg], *120.
Financial report, 599.
Gasket rack, Book type [Herms]. *1076.
Grease fitting for motorman's brake valve [Herms], *666.
Incinerator provides steam for shop use [Herms], *908.
Making truck swing-link bolts [Herms]. *121.
Testing field coils [Tipton]. *121.
Trolley hooks for car storage [Tipton]. *823.
Wool-waste packed universal joints Trolley hooks for car storage [Tipton].

*823.

Wool-waste packed universal joints
[Herms]. *284.

Sanford, Me.:

—York Utilities Co.
Smoking to be voted on, 175.

San Francisco, Cal.:
—Central California Traction Co.:
Abandonment denied, 179.

Market Street Ry.:

Byllesby prize won by J. M. Yount, 256.
Financial report, 638; Comment on, 685.
Franchise negotiations, 1086.
Free window displays, 710.

Montromery Street line abandoned, Parade, *254.

Rubber used to reduce noise and vibration on cars, 358.
—Sacramento Northern Ry.:
Personnel changes, 793.
—San Francisco Municipal Ry.:

Personnel changes, 793.

—San Francisco Municipal Ry.:
Financial outflook, Report on, 1091.
Financial report, 31; Comment on, 146.
Municipal operation, non-political; Comment on, 887.
Recommendations for improvements, 755.
Track construction plans, 134.
Track extension, Progress, 833.

—Traffic survey, Details, *1060.

San Jose, Cal.:
—Fare increases, 707.

Santa Barbara, Cal.:
—Santa Barbara & Suburban Ry.:
Experimental fares, 91.
Property offered to city, 520.

Santa Rosa, Cal.:

—Petaluma & Santa Rosa R.R.:

Financial report, 638,

Western Pacific offers to purchase, 340.

Sault Ste. Marle, Mich.:

—Sault Ste. Marle Traction Co.:

Purchase by community, 791.

Savannah, Ga.:

—Savannah Electric & Power Co.:

Buses installed for steam railroad employees, 216,

Fare increase sought, 707, 873.

Fare increase sought, 707, 873.

Schedules and time tables:

Brakes, effect on schedule speeds [Fitch], 247; Comments on 227.

Car speed increase discussed by N.Y.E.R.A.; Comments on, 227.

Columbus, Ohio, Ordinance speeds cars, 958.

Columbus, Ohio, Skip-stop system installed, 632, 1006.

Detroit. Mich., express and local schedules, Details, *4.

—Fast schedules bring riders [McIlraith], 533, —Frankfort, Ind., Ordinauce Appealed, 555, —Germany high-speed line, Curves [Breslauer], *501,

—Highwood, Ill., Graphs simplify schedules [Blackhall], *930; Comments on, 927.

—Importance of [McIlraith], 1031.

—Iodianapolis, Ind., Skipstop plan postponed, 957.

—Kansas City, Mo., One-man car schedules, *490.

*490.

-Midwest Association discusses speed, 950.

-Montreal, Can., Halfway stops abolished, 1007.

-Motors, High-speed, Advantages of [Storer], 244; Comuents on, 227.

-Portland, Maine, Schedule reduced, 679.

-Rochester, N. Y., Schedule changes, 672.

-St. Louis, Mo., Skip stop system installed, 633.

633.

San Antonio, Texas, Service record, 336.

Terre Haute, Ind., New schedule sought, 336.

Toledo, Ohio, Schedules revised, 591.

What makes the street car slow, Comments on, 186.

Schenectady, N. Y.:
—Schenectady Ry.:
Fare hearings, 133, 211. Shelburne Falls, Mass.:
—Shelburne Falls & Colrain Street Ry.:
Public auction sale, 791.

Scotland (See Great Britain).

Scenarion, Pa.:

—Lackawanna & Wyoming Valley R.R.:
Cars ordered, Details, 796.
Financial reorganization, 377.
—Scranton Ry.:
Wage agreement, 590.
Wage increase sought, 512.

Seats, Car:

—Detroit, Mich., Cross-seats, *900.

—Edinburgh, Scotland, Upholstered adopted, 337.

adopted, 337.

—Glasgow, Scotland, *398.

—Leavemoorth, Kans., Upholstered, *355.

—Los Angeles, Cal., Upholstered seats installed in ears, 1016.

—Milwaukce, Wis., Details [Gordon], *351.

—Osgood Bradley sample car, *1020; Comments on, 1018.

—Pittsburgh, Pa., Bucket type, *773; Experimental cars [Gordon], *888; Comments on, 885.

—St. Louis, Mo., Chair car, *855.

-St. Louis. Mo., Chair car, *855. -Western Ohio Ry., *695.

Seattle, Wash.:

—Bus bids considered, 719.

—Litigation, Appeal to withdraw suit, 255.

—Mayor Landes defeated, 480.

—Pacific Northwest Traction Co.:

Bus permit denied, 30.

Fares reduced, 410, 632.

—Puset Sound Power & Light Co.:

Budget for 1928, 143.

Interest payments due, 180.

Municipal debt diminished, 517.

—Railway loan fund, 257.

Seattle Municipal Ry.:

Bond payment made, 380.

Bus operating plans, 1649.

Cars ordered, Detaile, 883.

Financial report, 340.

Financial report, 340.

Financial situation, 93.

Five-cent fare plan, 28; Results, *253.

Fund plan fails, 132.

Purchase and bond ordinances suit appealed, 29.

Rail-bus service installed, 712.

Rerouting of cars recommended, 874.

Taxes to be paid by loans, 302.

Taxicab competition, 373.

Track extension plans, 485.

—Seattle & Rainier Valley Ry.:

Payments in arrears to tity, 714.

Tax relief bill passed, 412.

—Taxicab operating plan proposed, 592.

Shehoygan, Wis:

-Taxicab operating plan proposed, 592,

Shehoygan, Wis.:

—Wisconsin Power & Light Co.:
Fare increase sought, 332.
Test rack for bus brakes [Hettinger], *740.

Signals:

—Los Angeles, Cal., Block signals installed,

Pittsburgh, Pa., Block system ordered, 968. — Proboursa, Pa., Block sy Sioux City. Iowa: — Sioux City Service Co.: Fare increase. 787. — Iowa Public Service Co.: Property sold, 418.

Smoke pollution reduced by electrification, Chicago, 576.

Chicago, 576.

Suow and lee removal:

—Boston. Mass., Equipment and methods, *737.

—Holland orders snow scrapers, 604.

—New York City, Weather bureau aids, 861.

—Worcester, Mass., Costs of, 576.

South America, Railway service in large cities [Floyd], *1073.

[Floyd], *1073.

South Bend, *1073.

-Chicago, South Bend & Northern Indiana Ry.:

Bus property sold, 875.

Bus service extended, 417, 749.

Commutation fares reduced, 1085.

Feeder bus service opposed, 516.

Foreclosure, 139.

Free transportation on Bargain Day, 958.

Southwestern Public Service Association:

-Annual meeting, Report, 777.

-Traffic and public relations discussed, 292.

Southwest Missouri R.R. (See Jonlin, Mo.).

Southwest Missouri R.R. (See Joplin, Mo.).

Special trackwork:

-A.E.R.E.A. committee work, 827.

-Manganese crossing specifications, 1056.

Spokane, Wash.:
—Spokane, Coeur d'Alene & Palouse Ry.:
Franchise extension sought, 554.

-Utility merger planned, 179.

Springfield, III.:

-Illinois Power Co.:

Fare increase sought, 255.

Financial report, 712.

Financial report, 712.

Springfield, Mass.:
—Springfield Street Ry.:
Energy consumption on experimental car [Harwood], 550.

New directors elected, 33, Old cars burned, *555.
Rehabilitation during 1927. Details, *613. Special bus trips installed, 877.

Springfield, Ohio:
—Dayton & Columbus Transportation Co.:
Test block for bus engines [Foote], *659.
—Indiana, Columbus & Eastern Traction Co.:
Merchandising plan, *770.
Service resumption demanded, 95.
—Springfield Ry.:
Earnings impounded, 680.
Financial situation, 631.
Receiver appointed, 180.

Standardization:

Receiver appointed, 180.

Standardization:
—Die chaser's recommendation, 794.
—European rails, *535.
—Mathematical symbols, 669.
—Preferred numbers proposed by A.E.S.C., 589.
—Rails and ties, Europe, Details [Noorbeeck], *912; Comments on, 887.
—Simplified invoice form. Usc of [Hudson], 343; Comments on, 187.
—Uniform vahida code 409

—Uniform vehicle code, 409. —Vitrified paving brick sizes, 682.

Stark Electric R.R. (See Alliance, Ohio). Statisties:

--Abandonments in 1927, *51; Comments on, 40.

-Articulated car designs and users [Clardy],

-Automotive equipment purchases in 1927, 69.

-Automotive operating costs [Jordan], *319.

-Berlin, Germany, Traffic, 1007,

-Bond issues and maturities in 1927, *70;

Comments on, 40.

-Budgets planned for 1928, *45; Comments on,

Statistics (Continued):

—Bus operation by electric railways in 1927,

*63; Comments oo, 40,

—Bus operations in Germany, 874.

—Canadhan railway traffic [Weyman], 995;

Comments on, 969.

—Car heating costs, Analysis [Wheeler], c905;

[Baumgarten], c906.

—Car orders analyzed, 1927, *56; Comments on, 41.

Electrified lines, Distribution systems [Healy],

*8; Comments on, 3.

Electric locomotives ordered in 1927, *56,

—Employment statistics, Cleveland, Ohio, *767,

—Energy consumption by railways, *818,

German electrification statistics [Healy],

*1837.

—Heavy electric traction statistics, *1927, *51. *937.

-Heavy electric traction statistics, *1927, *51.

-Highwood, Ill., Graphs used to keep records [Blackhall], *930; Comments on, 927.

-Japan railway improvements in 1927, 874.

-Levis, Que., Passenger and revenue increase 1924-28 [Weyman], *901; Comments on 885 1824-28 [Weyman], *961; Comments on 885.

—Market conditions in 1927 reviewed, *85, Cumments on, 105.

—Newark, N. J., Transportation statistics, 597*

Comments on, 508.

—One-man car operation, Little Rock, Ark., *724.

—Parking cars, Vehicle survey, Chicago, Ill. [Melbraith], *189.

—Passenger ears ordered in 1927, *56; Comments on, 41.

—Passenger traffic: Chicago, Ill., Christmas, *29, N.Y.W.&B, R.R., 30.

—Railway and bus operation, 329.

—Railway costs and fares, 1927 [Richey], *79, Railway, Operating, statements, 1927, A.E.R.A. report, 750, 961; Comments on, 723. —Railway operating statistics, *42; Comments on, 39. on, 39.

Railways report to I.C.C., 136.

Receiverships, 1927 reviewed, *82; Comments on, 146.

Revenue passengers and fares, Comparison Iswainel, *935; Comments on, 927.

Riding habit statistics, 1926.

Rochester, N. Y., Subway traffic, *213.

Steel Twin tie installations, 1926-27, [Lavan], *447. Steel Twin the installations, 1926-27, [Lavan], *447.
Street space occupied by auto and street car, Dayton, Ohio, *1026.
—Substations, Rectifier and converter performance [Antoniono], *11; Comments on, 20.
—Track construction 1927, Statistics, *51; Comments on, 40.
—Track construction costs, Index numbers of, *191.
—Traffic count, San Francisco, Cal., *1060.
—Traffic in and wage figures, A.E.R.A., 98, 596, 677, 755, 849, 964.
—Trolley wire failures, Analysis [Scott], *278, —Unemployment report by Amalgamated, 371.
—Vehicle accidents, San Francisco, Cal., *1060.
—Vehicle speeds, Detroit, Mich., 334.
—Wages increased, 1926-1927, 903.
Steao railroads organize motor transport di-Steam railroads organize motor transport division 30. Stone & Webster open Paris office, 383. tores:

Denver, Colo., Oil house [Minister], *658.

Lubricant storage, Details [Brewer], *453.

Purchasing methods for, Comments on, 970.

Stock book for stabilizing [Weston], *357. Storm and tire damage:

—Newburgh, N. Y.; Buses burned, *595.

—Ohio utilities damaged by sleet storm, 592. Street traffic congestion (see also Parking of cars).

—A.E.R.A. Committee activities, 251; Comments on, 266.

—Baltimore, Md., Keeping coal wagons off car tracks, 736.

—Chieago, Ill., Parking ordinance to relieve [McDraith], *188; Comments on, 185.

—Detroit, Mich., Express railway service speeds traffic, 334, 358, 479; Comments on, 386.

—Detroit, Mich., Traffic flow, Details, *570.

—Efficient use of existing streets [Miller], 1038.

—Increased car speeds discussed by N. Y.

—Electric Ry. Assn.; Comments on, 227.

—Increased street car speed will aid [Storrs], 245.

—Increasing the capacity of street systems. 245.

Increasing the capacity of street systems [Simpson], 1039.

Lemoyne, Pa., Relief plans, 133.

Los Aogeles, Cal., Hose bridge, *734.

Nation's Traffic, Award for relief suggestions, 1648.

New York City:
Decentralization, Comments on, 799.

Rallway weather bureau aids snow fighting, 861. Stagger system to relieve, 174. —Parking cars (See parking of cars).
—Plans for relief, Comments oo. 147.
—Prize offered for traffic solutions, 515.
—Solution of traffic problems, Essentials of [Locke], 548.
—Southwestern Association discussion, 777.
—Street cars help relieve [Woodward], 228.
—Traffic lights relieve [Emerson], 246.
—Vancouver, B, C., Staggered hours for students, 337. Strikes and arbitrations:

-Chicago, Ill., Wage arbitration, 91, 173,

-Fort Wayne, Ind., 252,

-Indianapolis, Ind., Strike organizers' leave jail, 371,

Strikes and arbitrations (Cootioued):

—Memphis, Tenn., Arbitration agreement, 557.

—New Haven, Conn., Strike situation, 1084.

—New York City, Strike talk revived, 372;

Comments on, 347.

—Pottsville, Pa., Strike, 92, 135, 375.

—St. Louis, Mo., Arbitration, 786, 834, 871.

—Turonto, Can., Arbitration, 1005, 1045.

Substations and equipment:

—Automatic:

Cincinnati, Ohio, Supervisory control, \$117. Third Avenue Ry. (See New York City). Thes:

—A.E.R.A. discussed. 509.

—Improvements in, Europe [Noorbeeck], *912;
Comments on, 887.

—Requirements, Trend of, 925.

—Steel Twin installations, 1926-27 [Lavau],

*447. *447.

Toledo, Ohlo:
—Bus controversy, 176.
—Community Traction Co.:
Financial report, 178, 341, 596, 677.
Franchise negotiations, 631, 297, 479, 512, 631, 787.
Franchise ordinance, Details, 916, 058, Schedules revised, 591.
Transit plan, 1085. -Automatic:
Cincinnati, Ohio, Supervisory control, *117;
Details, 443 [Swilt], *688,
Havana, Cuba, Details [Whitlow], *348.
-Brazil, Portable substation, 842,
-Germany, For electrified operation [Healy], *937.
-Highwood, Ill., Rectifier and converters *937.

Highwood, Ill., Rectifier and converters compared Details [Antoniono], *11; Comments on, 2.

Mercury are rectifiers, French railway, *622.

Milwaukce, Wis., Details [Gordon], *310. Transit plan, 1085.

Toronto, Can.:

—Canadian National Electric Rys.:

Fark property purchased, 560.

—Toronto Transportation Commission:

Arbitration, 1605, 1045

Automatic shutters on transformer blowers

[Schwegler]. *824.

Grinding heel recess in switch castings
[McCallum], *285.

Lacquer tests, 643.

New buses delivered, *642.

Newspaper comments on service, 512.

Oil heaters for thawing frozen switches

[Fennell], *283, 406.

Protection for cross bonding [Feunell], *822.

Reclaiming brake shoe hangers [McDowell] -Milwaukce, wis. Decade,
Switzerland:
-Electrical operation profitable, Details, *198.
-One-man locomotives, 1007.
Syracuse, N. Y.:
-Syracuse Co-ordinated Bus Line, Inc.:
Permanent franchises sought, 595.
-Syracuse, Lake Shore & Northern Ry.:
Foreclosure proceedings, 637. Tacoma, Wash.:

—Bus controversy, 215.

—Puget Sound Electric Ry.:
Receiver appointed, 379, 637.

—Tacoma Railway & Power Co.:
Financial situation, 218; Comments on, 185.

Municipal ownership suggested, 214.
Revaluation proposed, 138.
Special rates continued, 411. Reclaiming brake shoe hangers [McDowell], *473. School and equipment for trainmen [McRae], *608, Test equipment for door engines [Fanning], *283. Testing frame for track packs [McCallum], *821.
Truck for handling lift packs [Pollard]. Wage negotiations, 553, 954.
Wheel construction for portable equipment [Buker], *662. Taxes:
—boston, Mass., Capital stock tax suit lost, -Doston, Mass., Capital stock tax sure rost, 483.

-California tax system protested, 521.
-Cheveland, Ohio, Surplus tax decision appealed, 219.
-Danville, Va., Tax relief sought, 709.
-Detroit, Mich., Tax relief sought for municipal imployees, 920.

-Hartford, Comn., Bus taxes, 215.
-Inimors gasoline tax rescinded, 416.
-Interstate bus tax upheld, Conn., 338.
-License tax on interstate buses invalid, 837.
-Morris County Traction Co. taxes, 597.
-Paving rehet: Track construction:

-European methods, Details [Blake]. *535;
[Lensrtowicz]. *858; *947.

-Altoona, Pa., Reconstruction methods, Details, *498.

-Atlanta, Ga., Concrete beam method, *114,

-Berlin, N. H., Reconstruction methods [Noyes]. *273.

-Boston, Mass., Man power saving, Comments on, 797.

-Cologne, Germany, Track, 1812, 2013. Track construction: Cologne, Germany, Track laid without ties [Schwauter], *979.
 Cost consideration in car replacement, Comments on, 647. Morris County Traction Co. taxes, 597.

Paving rehel:
Discussed by Chamber of Commerce Secretaries, 255.
East St. Louis, Ill., 295.
Mobile, Ala., 28.
New York, Bill proposed, 133, 512.
Ogdensburg, N. Y., 633; Comments on, 605.

—Railway taxes unjust [Woodward], 228.
—St. Louis, Mo., 1927 payments, 302.
—Seattle, Wash, Taxes paid by loan, 302.
—Seattle, Wash, Taxes paid by loan, 302.
—Scattle, Wash, Taxes paid by loan, 302.
—Scattle, Wash, Taxes paid by loan, 302.
—South River, N. J., praised as taxless town, Comments oo, 687.

—Tulsa, Okia., Tax tlaim settled, 98. ments on, 647,

—Costs, Index numbers of, *191.
—Cruciform rail supports, Tests, *277,
—Dallas, Tex., Reconstruction plans, 795,
—Galveston, Texas, T-rails used, 795,
—Jugoslavia, Methods of [Manollovitch], *115,
—Kansas City, Mo., Visduct, *700,
—Methods used and equipment for, Details
[Lavan], *447,
—Michigan City, Ind., Reconstruction, 1614,
—Milwaukee, Wis., Details [Gordon], *310,
—Omaha, Neb., Reconstruction controversy, 133,
—Pittsburgh, Pa., Culvert, Details [Sumner],
*856, 'axicabs;

-Cincinnati, Ohio, Merger, 959,

-Newark, N. J., Taxi purchase plans, 919,

-Philadelphia, Pa.;

Cruising regulation, 479,

Gas-electric cab, Design, *288,

Maintenance program, 497,

No-cruising ordinance, 136,

-Purchase of, 136, 481,

-Seattle, Wash, Cut-rate war, 373,

-Seattle, Wash, Merger plan, 592, —Pontiac, Mich., Details, *581, —Review of 1927, Statistics, *51; Comments on, 40. —San Francisco. Cal., Plans for, 134.
—Springfield, Mass., Reconstruction in 1927.
*613.
—Sydney, N.S.W., Automatic switch for reversing trains, 728.
—Tokio, Japan, Subway, 1087.
—Wood tie construction, Atlanta, Ga., Details [Smith], *439. Tennessee Electric Power Co. (See Chatta-nooga, Tenn.) Trackless trolleys:

—Manila, P. I., Details, *391,

—Prague, Czechoslovakia, Installation, *415,

642. Terminals and waiting stations:

—Chicago, Ill., Bus terminal plans, 675.
—Chicago, Ill., Terminal started, 720, 968.
—Columbus, Ohio, Freight terminal enlarged, Details, *363.
—Illinois Traction terminal improvements, St.
Louis, Mo., 917.
—Interborough, Lengthening of local platforms ordered, 94.
—Little Rock, Ark., Details, *240.
—Newsrk, N. J., Terminal construction plans, 784. Progress in design, Comments on, 527.
Salt Lake City, Utah, Trolley bus permit sought, 875. Track maintenance:

—Effect of unsprung weight on track wear,
Tests. *463.

—Eric. Pa., Details [Lewis], *812.

—Methods and equipment used, Details [Lavan],
*447; Comments on, 426.

—Washington, D. C., Bus service speeds track
repairs, 675.

—Woodside, N. Y., Sand car, Details, *651.

—Worcester, Mass., 968. Track maintenance: Oklahoma City. Okla., Bus station, 959,
Philadelphia bus terminal planned, 256.
Philadelphia, Pa., Station control contract, 566. 566.
—South Bend, Ind., New station, 223.
—Trenton, N. J., Terminal plans, 968. Terre Haute, Indianapolis & Eastern Traction Co. (See Indianapolis, Ind.): Tests of material and equipment:

-Air-magnetic brake tests, Cincinnati, Ohio,

*423, 926.

-Axle tests, Paris [Castaing], 860.

-Brusb-holder spring tension testing, B.-M.T.,

-Brush-holder spring tension testing, B.-M.T.,
*1075.

Joliet, Ill., Car heating tests [Baumgarten],
*648; Comments on, 645.

-Lightning arrester testing, New Orleans, La.
[Ruck], *652; Comments on, 647.

-Motor load testing, New Orleans, La.
[Naquin], *814; Comments on, 797.

-Ticless track tests, *277.

-Track vibration tests, Berlin, Germany,
*403.

Texas Electric Ry. (See Dallas, Texas).

Traffic Investigations (Continued):

—National institute for traffic research, Conference to discuss, 748.

—New York City, Suburban transit plan, Report, 255.

—Omaha, Neb., Traffic survey suggested, 672.

—Philadelphia, Pa., Transit report, 480.

—Pittsburgh Pa., Vehicle count. *320; Comments on, 345.

—Sat. Louis, Mo., 517, 630, 834, 1045.

—San Francisco, Cal., Engineer's report, Details, *1060.

—Seattle, Wash., Report, 874

Traffic regulation (see also Parking of cars):

—Boston, Mass., New code recommended, 832.

—Chicago, Ill., Ordinance prohibits mid-block turning, 709.

—Columbus, Ohio, Rallway ordinance, 871.

—Dayton, Ohio, Details, *1026.

—Kansas City, Kans., Board of control, 873.

—San Francisco, Cal., Control suggestions of engineer, *1060.

—Staggered hours for students, Vancouver, B. C., 337.

—Traffic control in large cities, Details [Lockel, 548.

—Traffic lights relieve congestion [Emerson], 246.

—Uniform vehicle code, 409; Details, 771, 782; Comments on, 847.

246.
—Uniform vehicle code, 409; Details, 771, 782;
Comments on, 847.
Traffic stimulation (see also Merchandising

Uniform vehicle code, 409; Details, 771, 782; Comments on, 847.
Traffic stimulation (see also Merchandising transportation);
A.E.R.A. distributes car riding posters, *208.
Building up the off-peak load [Jackson], c20.
Cleveland, Ohio, Rail-air service connections made, 914.
Columbus, Ohio, Skip-stop service installed, 632, 1007.
Detroit, Mich., Express and local experimental service, *4, 172, 334.
Developing new business by advertising and publicity [Soules], 551.
East St. Louis, Ill., New business campaign, 747.
Fast schedules bring riders [McIlraith], 533.
Gary, Ind., Excursion rates installed, 1085.
Gary, Ind., Guessing contest, 732.
Highwood, Ill., Better business campaign, 674; Excursions, 1085.
Increased speed will bring riders [Storrs], 245.
Levis, Que., Weekly pass increases revenue [Weyman], *901; Comments on, 885.
Montreal, Can., Halfway stops abolished, 1007.
Omaha, Neh., Skip stop service voted, 674.
Rates for the summer traveler, Comments on, 1057.
St. Louis, Mo., Rerouting planned, 1009.
Transfers (see Fare collection)

Louis, Mo., Rerouting planned, 1009.

-St. Louis, Mo., Rerouting planned, 1009.
Transfers (see Fare collection).
Transportation, Metropolitan:
-Future development, Methods for [McIlraith],
1031.
-Railways should furnish [Draper], 780.

Trenton, N. J.:

—Trenton & Mercer County Traction Corp.

Track improvements and terminal plans,
968.

968.
Trl-City Ry. (see Davenport, Iowa.)
Trucks:

—B.-M. T. repair methods and enuipment [Squler], *729; Comments on, 723.

—New York, Westchester & Boston Cars [Smith], *235.

—Osgood Bradley sample car, *1020.

—Overhauling system, Brooklyn, N. Y., Details [Squier], *632; Comments on, 646.

—Pittsburgh, Pa., Experimental cars [Gordon], *888; Comments on, 885.

Tulsa, Okla.:

—Oklahoma-Union Ry.:
Fares increased, 130, 336,
Sight-seeing bus service installed, 749,

—Tulsa Street Ry.:
Tax claim settled, 98.

Turkey:

—The Turk turns on the onion eater, Comments on, 347.

Twin Clty Rapid Transit Co. (see Minneapolis. Minn.):

Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Poblics Automobiles:

Electric Railway Journal becomes correspond-cert for, 910; Comments on, 887.

Union Internationale de Tramways, etc. (Con-finued): —Rome meeting:

Program, 90.
Papers at, *857, *858, *859, *860, *910, *913.
Proceedings, *947; Comments on, 887.
Transportation arrangements, 330.

Union des Voles Ferres et des Transports Automobiles:
—Papers, *704, *742. —rapers, *704, *742. Union Street Ry. (see New Bedford, Mass.) Union Traction Co. (see Anderson, Ind.) United Electric Rys. (see Providence, R. I.) United Railways & Electric Co. (see Baltimore, Md.)

United Traction Co. (see Albany, N. Y.) Utah-Edaho Central R.R. (see Ogden, Utah.) Utah Light & Traction Co. (see Salt Lake City, Utah.)

Vancouver, B. C., Can:

—British Columbia Electric Ry.:
Bus service expanded, 480.
Power plant constructed, 464.
Property sold, 713, 878, 1054.
Staggered bus service for school,
337.
Transportation in foreign lands published in employee magazine, 334.

Viaduct Construction:

—Kansas City, Mo., 479, *700.

—Los Angeles, Cal, *10.

Virginia Electric & Power Co. (see Bichmond, Virginia Public Service Co. (see Hampton, Va.):

Wage decreases:
—Gloversville, N. Y., 872.

Wage increases:

—Atlanta, Ga., 214.
—Battimore, Md., 335.
—Chicago, Ill., 173.
—Cleveland, Ohio, 784, 872.
—Pittsburgh, Pa., 708.
—Scranton, Pa., 590.

Wages and Working agreements:

Wages and Working agreements:

-A.E.R.A. traffic, fare and wage figures, 98, 596, 677, 755, 840, 964.

-Boston, Mass., Negotiations, 590,
-Cincinnati, Ohio, Renewal, 956.
-Detroit, Mich., Labor union contracts opposed by commission, 131.
-East St. Louis, Ill., Agreement renewed, 956, -Fort Wayne, Ind., Controversy, 556, 834, 873.
-Hamilton, Ont., Hearings, 958, -Memphis, Tenn., Agreement renewed, 372, 411, 557, 672.
-New Haven, Conn., Negotiations, 958, 1047, -New York State Rys, men seck increase, 590, -Railway wages increased, 903, -Richey's conspectus of indexes, 179, 340, 520, 715, 879, 1051; Chaoges in, 1051.
-Rochester, N. Y., Contract renewed, 834, -St. Louis, Mo., Negotiations, 134, 513, 710, 746, 786, -Seranton, Pa., New agreement, 512, 590, -Toronto, Ont., New wage agreement sought, 553, 954.

-- Scranton, Fa., New agreement, 512, 550.
-- Toronto, Ont., New wage agreement sought, 553, 954.
-- Trend in 1927 [Richey], *79.
-- Washington, Baltimore & Annapolis Electric R.R. (see Baltimore, Md.)

R.R. (see Baltimore, Md.)

Washington, D. C.:

—Capital Traction Co.:

Fare iocrease sought, 412, 917, 1046.

Financial report, 1011.

—Railway merger negotiations, 180, 258.

301, 481, 521, 597, 677, 713, 880, 920, 961, 1090; Comments on, 489, 845.

—Washington Railway & Electric Co.:

Bus line purchased, 788, 1049.

Bus night service speeds track repairs, 675.

Bus permit opposed, 594.

Cars ordered, Details, 143, *759.

Fare increase sought, Bus, 1088.

Financial report, 341.

—Wasbington Rapid Transit Co.:

Radiator cap design for buses, 788.

Wenther bureau in Gary, Ind. run by railway,

Welding:
—Acetylene welding process, Details [Gaston],
*457.

*457.

-American Welding Society meeting, 744.

-Gases, for, Consucer production, 795.

-Miller welding award changed, 999.

-School for are welders, Cleveland, Ohio, 583.

-Thermit welding rail points, Clamp for, 4116.

—Use in car body and truck construction, Europe, 932.

West Chester, Pa.:

—West Chester Street Ry.:

Directors elected, 517.

Financial readjustment, 179. West Penn Rys. (see Pittsburgh, Pa.)

Weels and axles:

-Maintenance methods, B.-M.T. [Squier], *805.

-Omaha, Neb., Car wheels performance records, *816.

-Parallel vs. radial axle cars [Castaing], 860.

-Radial-axle design, Europe [Harmel], *857.

Property sold, 680.

Wiehita, Kansas:

—Arkansas Valley Interurban Ry.:
Cars painted red as safety measure, 1083.
Higher fare urged by newspaper man, 674,
918.

—Wichita Transportation Co.:
New franchise sought, 556.

Wilmington, N. C.:
—Tide Water Power Co.:
Brady Memorial presentation, *332.
Safety methods win Brady award, Details,
233.

Winning Man. Can.

Winnipeg Man., Can.:

—Winnipeg Electric Co.:
Financial report, 922,
Gas-electric car, Design, *5
Labor dispute settled, 557
Personnel changes, 484.

Wisconsin Motor Coach Association:
—New officers elected, 291.
Wisconsin Public Service Corporation
Green Bay, Wis.)

Wood preservation:
—A.E.R.E.A. committee report, 827.
—Wood ties treated, Details [Smith], *439.

Wood ties treated, Details [Simon],
Worcester, Mass.:

Worcester Consolidated Street Ry.:
Banquet at closing of carhouse, 344,
Bus fare reduced, 134,
Carhouse and garage, Details, *274, *848;
Comments on, 885.
Future plans for city ownership, 562,
Old cars burned, 479, *555.
Rehabilitation program, 38,
Snow and ice removal costs, 576.
Track reconstruction, 968.

World Engineering Congress:

Y

Youngstown, Ohio:
—Municipal ownership of transit lines under consideration, 673.
—Pennsylvania-Ohio Electric Co.:
 Bus drivers' safety records, 256.
 Newspaper ads in booklet, 674.
 Safety contest, 375.
 Utility service advertised, 298.
—Youngstown Municipal Ry.:
 Fare increase, 130.
 Weekly pass restored, 130, 371.

\mathbf{Z}

Zanesville, (blio:

—Southern Ohio Public Service Co.:
Franchise granted, 515,
Improved adustment for brake release
spring [Morris], *988.
Personnel changes, 1053.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Illustrated. c Communications.

AUTHOR INDEX

Albin, H. A.:

--Efficient commutator slotting device, *119,
Antoniono, Caesar:

--Rectifier superior to converters on North
Shore Line, *11,
Austry, W. H.:

Austry, W. H.:

—Oil-sealed housings for railway motors, *982.

Bacqueyrisse, Louis:

—One-man cars and buses in Europe, *910.
Buine, J. C.:

—Bus garage spring rack, *989.
Baumgarten, A. W.:

—Energy from dynamic braking cuts heating costs, *048.

—Further analysis of car heating costs, c905.

Beers, R. S.:

—Further analysis of car deating costs.

—Freedom from controller troubles depends on thorough maintenance. *465.

—Magnet valve gage. *325.

—Simple, high-potential testing outfit, *505.

Bernd, O. H.:

—Des Moines reduces fire insurance cost 44.4 per cent, 583.

Bethel, C.:

—Double-reduction motor drive with opring suspension, *152.

Dirach I. W.:

Double-reduction motor drive with spring suspension, *152.

Birch, L. W.:

Neglected overhead is poor economy, *435.

Blackhall, J. R.:

Graphs assist in lowering costs and improving scrvice, *936.

Blake, Henry W.:

European track construction in paved streets, *535.

—Inert gas protects bus fuel in Parls, *395.

Bodoh, Joseph E.:

—Gutters reduce window cleaning, *988.

—Making old cars attractive, *275.

Botto, Louis T.:

—Concrete ties effect saving, *123.

—Conditioning double track for concreting, *281.

—Rails used in concrete tie construction, *986.

*281.

Rails used in concrete tie construction, *986.
Brammer, L. A.:

Grease lubrication for trolley wheels, *281.

Brebob, F. H.:

North Shore Line uses combination trolley and battery locomotives, *393.

Breslauer, Walter:

High-speed road for Germany, *501.

Brewer, Allen F.:

A good lubricant can be ruined by improper handling, *453.

Buckland, E. G.:

Manufacture transportation that will cell, 541.

Buker, William:

Strengthening wheel construction for port-

Buker, William:
—Strengthening wheel construction for portable equipment, *662.
Bullock, Harvey L.:
—Automatic test for control jumpers, *285.

Campbell, Thomas V.:

—Motor rehabilitation decreases troubles, *800.
Carpenter, Frank B.:

—Fixture for boring journal bearings in lathe, *663.
Castaing, Jean:
—Parallel versus radial axles for cars, 860.
Chiles, R. T.:

—Convenient receptacle for switch irons, *282.

—General utility line truck, *775.

—Grease fittings for lubrication of ball bearing motors, *663.

—Improved pedestal tie bar extends across truck pedestal jaws, *474.

—Keeping motor fields in good condition, 863.

—Motor intake cover to keep out snow, *825.

—Motor leads on axle side reduce trouble, 908.

—Phosphor-bronze armature bearings profitable, *120.

—Reinforced truck requires little maintenance.

—Reinforced truck requires little maintenance,

*787.

—Support prevents breaking of sand hopper bases, *946.

—Tie bar prevents spreading of pedestal jaws, *740.

Clardy, W. J.:

—Articulated cars meet unusual requirements, *17.

Clegg, Arthur E.:

—Air compressor armature stand, *664.

—Attachment for lifting armatures quickly, *825.

—Convenient commutator peek slot cleaner.

Davies, J. J.:

—Public relations man plays an important role,

*696,
Dean, John S.:

—How worn carbons or brush-holder boxes
affect the neutral position, *1076,

—Your motor leads require adequate attention,

*469.

de Ribes, J. Champetier;
—One-man cars in Europe, *704.
Dillavou, E. R.;
—Terminable permits are proving their worth,

Terminable permits are proving then 1975, 495.
Drsper, Walter A.:
—The road to better city transportation, 780.
Drugen, D. E.:
—The bus in urban transportation, 165.
Duffy, J. A.:
—Jig insures accurate boring of armature bearings in housings, *626.
—Press saves time in bearing removal, *119.

Eastham, E. K.:

—Selfishness and misunderstanding are hindering safety work, 866.

Emerson, R. W.:

—Traffic lights relieve congestion, 246.

Fanning, G. R.:

—Test equipment for door engines, *283.

Fennell, R. J.:

—Oil heaters for thawing frozen switches, *283. -Protection for cross bonding in concrete,

Fitch, E. R.:

—Brakes as they affect schedule speeds and accidents, 247.

accidents, 24..

Floyd Arthur:

—South American cities have fine rallway service, *1073,

Foote, F. J.:

—Block for running in bus engines, *659,

Frehse, Ray S.:

—Speedy service requires efficient door mechanism, *441.

Gaston, W. I.:

—Acetylene welding cuts maintenance coroers.

*457.
Gerhart, P. F.:

Gerhart, P. F.;

—Connecting rod for electric track switches,

*284.
Gleason, A. E.;

—Anchorede crossings will not drift with

traffic. *473.
Gordon, Charles;

—Pittsburgh seeks more popular street car,

*888.

—Service first is Milwaukec's transportatio*

slogan, *310, *351.
Graubner, G. E.;

—Sticking M-28 brake valves cured, *585.

H

Hall, Benjamin H.:

—Better lubrication for old type motors. *475.

—Bushing for carrying motor leads through frame. *286.

-Device for straightening brake and door rods, *821.

Device for straightening brake and door rods, *821.
Making removal of cab heaters easy, *701.
Motor lead connection block, *666.
Hall, C. B.:
Jig for testing bent axles, *822.
Sleeves prevents bending while installing shafts, *985.
Split sleeve protects end of shaft while being pressed into wheel, *664.
Harmel, Charles:
Radiad-axle ears, *857.
Harwood, E. L.:
Energy consumption low on Springfield experimental car, 550.
Healy, Kent T.:
High-voltage a.c. system in Italy, *317.
Light construction features European overhead, *8.
Many German railroads are electrified, *937.
Herman, R. L.:
New car designs are here, 997.
Herms, Charles:
Book type gasket rack, *1076.
Brush-holders broached when worn, *476.
Brush-holders broached when worn, *476.

Herms, Charles:

Book type gasket rack, *1076,

Brush-holders broached when worn, *476.

Bus wheel aligning gage, *1035.

Clutch plate facing jig, *990.

Connections on bell box saves time, *945.

Die for making truck swing-link bolts, *121,

Grease fitting applied to mntorman's brake valve, *666.

Incinerator provides steam for shop use, *908.

Wool-waste packed universal joints, *284,

Hettinger, Eugene M.:

Test rack for motor coach brakes, *740,

Hudson, Ray M.:

Use of simplified invoice form steadily ir-

-Test race ...

Hudson, Ray M.:

-Use of simplified invoice form steadily increasing, 343.

fves. Henry Swift:
—The Santa Claus idea of government, 508.

Jackson, John W.:

—Watch the condition of your varnish in dipping and baking, *461.

Jackson, Walter:

—The off-peak load can be built up, e20.

—Using power and light ideas in selling rides, 830.

Jordan H. F.

Jordan, H. E.:

—Manuals of operation and accounting, *359.

—Sell rides on low cost, *319.

Relly, Ed. C.:

—Card records show condition of equipment,

*123.

—Truck for handling car wheels and axles,

*1035.

Klein, Julius:

—Employment situation basically sound, 602.

Kraus, Gus C.:

—Bus air reservoirs filled from shop air, *989.

—Maintenance vs. repairs, 290.

Kung, H. O.:

—Purchase of Tientsin, China, street railway

a problem, 612.

Lavan, T. J.:

—Attention to details is the secret of low track cost, °447.
Lenartowicz, J.:

—Electric railway construction on city reservations, °858.
Lewis, W. L.:

—Rails replaced without disturbing ties, °812.
Lindsay, A. M.:

—Handy type of foot gong bracket, °475.
Locke, Dean J.:

—Traffic and traffic control in various large cities, 548.

MacKay. D. S.:

—Gun iron used for brake drums, *662.

MacMurray, G. J.:

—Only a mint doesn't need to merchandise.

*73.

Manoflovitch, Milan;
 Jugoslavia and American track differ in many respects, *115.

respects, *115.

Mariage, André:
—Paris adopts new system of fare collection,
*1078.

Martin, Frank J.:
—Grinding out rail corrugations. *286.
—Valve regulator for pneumatically operated wire brush, *661.

Mattersdorf, Dr. W.:
—What happens to an snti-climber, *933.
Mercier, Joseph:
—Convenient and powerful spike puller, *124.
Miller, John A., Jr.:
—Making more efficient use of existing streets,
1038.
Minister, H. L.:
—Oil house for Denver Tramway, *658.
Moller, G. F.:
—Light-weight double-deck car for Scottish
Tramway, *494.
Morris, I. F.,
—Improved adjustment for brake release spring,
**0882*

-Improved adjustment for brake release spring,

Murphy, E. J.;
—Well-trained motormen create good will, *401.

Me

McAloney, W. H.:.

—Maintenance costs reduced by new equipment.

*984.

McCallum, W. J.:

—Machine for grinding heel recess in switch

machine, *285.

McCarlum, w. J.:

—Machine for grinding heel recess in switch castings, *285.

—Testing frame for track jacks, *821.

McCartney, J. A.:

—Compromise thermit joints made witbout wax, *985.

—Convenient mounting for electric shovel truck, *474.

McClain, O. R.:

—Compressed air vacuum cleaner, *987.

McDowell, John:

—Reclaiming ball type brake shoe hangers, *473.

McGraw, James H.:

—Advertising and the maintenance of prosperity, 269,

McIlraith, E. J.:

—Are we merely running cars? 1031.

—Chicago prohibits parking in its central area, *188.

—Fast schedules bring car riders, 533.

*188,
—Fast schedules bring car riders, 533,
McRae, W. R.:
—Modern equipment used for instructing
Toronto's trainmen, *608,
McWhorter, A. D.:
—Progress In band brake design, 248,

N

Naquin, A. J.:

-Railway motor load testing set, *814.

Needham, Ray B.:

—Meeting motor truck competition, *196.
Nieuwenhuis, P. M.:

—One-man car operation in Hollaud, 859.
Noyes, Harry W.:

—Berlin, N. H., does extensive track rehabilitation, *273.

Oakley, George E.:
—Careful training of workmen insures high-grade door maintenance, 434.

Persons, Niles:

—Modernizing car equipment maintenance, 1043.

Pollard, A. G.:

—Truck for handling lift jacks, *665.

Porter, C. J.:

-Truck for handing fit jacks, *005.

Porter, C. J.:

-Car shop and garage is of latest design. *1068,

Pressler, H, C.:

-Bushing provides increased service for brake
hangers, *325.

-Zerk fitting used for lubrication of brake
valve, *476.

Richey, Albert S.:

—Electric railway costs and fares in 1927,

**79.*

Ruck, Jeff:

—Lighting arrester testing set, *652.

Savage, Hugh:

—Lack of progress in car cleaning, 1042.
Sawtelle, E. S.:

—Attention to gearing reduces maintenance of entire car, *444.
Schwanter, R.:

—Cologne lays track without ties, *979.
Schwegler, M. D.:

—Automatic shutters on blowers for air-cooled transformers, *824.
Segard, Dr. C. P.:

—Analyzing trolley line failures, *278.
Segard, Dr. C. P.:

—Selection of men as it affects service, 1041.
Shannahan, J. N.:

—Play the game square, 998.
Shellow, Dr. S. M.:

—The place of the interview in selection, 368.

Simpson, Hawley S.:
—Increasing the capacity of a street system.
1039.
Smith, C. A.:
—Impregnation pays with wood tie coustruction, *439.
Smith, Walter H.:
—Single-phase equipment for New York,
Westchester & Boston R.R., *235.
Snow, P. C.:
—Buffalo transfer embodies new features, *364.
Soules, E. E.:
—New business can be developed with advertising and publicity, 551.
Squier, Clarence W.:
—Careful overhauling of motors prevents service interruption, *972.
—Maintenance practices that permit failures cost money, *428.
—Truck overhauling systematized in Brooklyn, *653.
—Truck repairs put on a high-speed basis, *729.
—Wheel, gear and axle maintenance, *805.

Truck repairs put on a high-speed basis,

"729"
Wheel, gear and axle maintenance, *805.
Stevens, R. P.:

The future of electric railways is no longer in question, 764.
Stinemetz, W. R.:

Gas-electric cars cut railroad costs, *575.
Storer, N. W.:

Advantages of high-speed railway motors,
244.
Storrs, Lucius S.:

Electric railways are not looking for charity, 547.

Keep on the move or dic, 245.
Summer, M. R.:

Culvert built under difficulties, *856.
Swaine, James W.:

Has the economic limit in car fare been reached? *935.
Swift, Harley L.:

Cincinnati adopts supervisory control for power system, *117.

Full-automatic supervisory controlled distribution system, *688.

Taurman. A.:

—Centering truck for testing car axles, *122.

Thomas, Albert M.:

—Better methol of lubricating brake rigging needed, *1036.

Tipton, Farrell:

—Clip tongs aid bus spring installation, *661.

—Periodic testing of field coils reduces trouble, *121.

Tifton, Farrell (Continued):
—Staggered trolley hooks permit placing care close together, *8:23.

Uhlich, Paul:
—Elevating truck for air compressor, *665.

Van Noorbeeck, Ed.:

—Improvements in rails and ties, *912.

Verdollin, Heuri:

—Psycho-technical selection of employees lu
Paris, *742.

Volence, Frank:

—Commutator wire-slot cleaning tools, *122.

w

Weber, W. L.:
—Periodical physical examination of trainmen, 1080.

Weir, J. W.:

—Fireproof lacquer spray room, *1075.

—Instruction panel explains treadle door operation. *1034.

-mstruction panel explains treadle door operation. *1034.

Weston, R. A.:

—The stock book for stabilizing stores, *357.

Weyman, H. E.:

—Better transportation can be sold, 995.

—Levis Tramways increase revenue with weekly pass. *901.

Wheeler, W. C.:

—Further analysis of car heating costs, c905.

—More on car heating costs, c1074.

Whitehorne, Earl:

—How price cutting works, 524.

—Public opinion within industry will stop price cutting, 967.

—Who pays the cost of price cutting? 304.

Whitlow, G. S.:

—Two automatic substations installed in Cuba, *348.

Williams, H. S.:

Williams, H. S.:

—Adjustable pit light, *1036,

—Oil is superior to grease for gear lubrication,

*241.

Woodward, Roland B.:

—Most people are fair when they understand, 228.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Illustrated. e Communications.

PERSONAL INDEX

(with biographical notes)

	D 11 D 1 1 1 7	* 1 5 .	nie nie nie			
A Adams, Walter L	FIRE A. d	Leussler, R. A. *35 Linforth, Frank J. 1013 Lingeman, H. B. .758 Lockhart, Joseph A. 717, 882 Longrey, James A. *966 Longmore, W. J. .262 Loomis, Leo E. *181 Loring, Homer 513 Louer, Abram V. 757	Ries, Elias Elkan 717 Ritchie, John A. 264 Roach, Roy 422 Robinson, Dwight P. *141 Robinson, Henry A. 484 Rodger, W. S. *303 Ross, John L. 522 Rushing, G. D. 522			
Bargett, Grover C. 182 Baker, A. C. 484 Bassett, E. C. 221 Baughman, William C. 601 Beadle, W. J. 717 Beique, Paul 681 Bendell, C. R. 342 Benedict, M. O. 522 Bennett, A. V. 793 Bennett, Jumes C. 36 Borey, Richard A. 342	Frey, George	Mackay, D. S	Saint-Cyr. J. F. 681° Samworth. F. W. '924° Sanford, Harry C. 717 Saunders. Bertram H. 1093 Savage, Howard P. 479 Sawyer. W. H. '785 Schmunk John F. 140°			
Bennett, James C. 36 Berry, Riehard A. 342 Birch, L. W. 566 Bosserman, P. R. 522 Bostwick, Charles E. 681 Bowic, H. R. *924 Bradley, Luke C. *1094 Brady, Paul T. 793 Brennan, F. J. *181 Bristol, T. R. 564	Gould, Harold M	Maximov, P. A. 641 Miller, A. E. 758 Mills, F. M. 717 Miner, D. F. 262 Mitten, Dr. A. 522 Mitten, Clarence E. 261 Mitten, T. E. 563 Moore, Benjamin T. 641 Moore, Edward W. 793 Morris, G. E. 601	Schmink John F. 140 Schültz, Otto 563 Schweitzer, John J. 303 Shank, Samuel Lewis 36 Shaw. O. J. 421 Sherman, M. H. 563 Siebert, William 422 Simmons, F. G. 262 Slade, Walter C. 1093 Stevens, R. P. 785, 1094 Stewart, William 262			
Brooks, C. A. 681 Brown, Frank Henry 1054 Buffe, Fred G. 1054 Bullard, George Partridge 681 Burke, W. H. 881 Burley, Vine W. 601	II Haekett, James A	Morse, George G. 757 Mulligan. Edward J. 142 Myers, Clarence E. 36	Sulfivan, Murray			
C Carpenter, Frank B. *820 Carter, Earl L	Hardy, F. I. 342 Harris, L. J. 140 Harrison, J. S. 641 Harvey, D. W. 1053 Hatton, Ernest 882 Healy, F. A. 382 Hedley, Frank 174 Hertz, John 264	McAuliff. C. F. 1013 McCarter, Thomas N. *914 McCartney, J. A. *660 McDougal, Guy 382 McEldowney, Henry C. 793 McGraw, James H. 208 McKlay, Col. Douglas 1 719 McQuaid, George 422	Taurman, A. *280 Taylor, W. H. 342 Terrance, D. J. 342, 1094 Trench, W. W. 484 Tretton, James P. *523 Trissler, James H. 966 Truett, John H. 363 Tunis, Allyn B. 262			
Church, Leonard H. 101 Clark, A. T. 966 Cloyd, Hardy H. 382 Clunis, F. J. 1053 Cobb, B. C. 785 Collins, John F. 641 Comer ford, Frank D. 1094 Connolly, H. T. 641 Countor, John 842	Hewitt, J. A. 1053 Hodges, A. LeRoy 1146 Hollister, J. B. 483 Howard, Charles P. 523 Hoyer, L. H. 1281 Hubbell, Harvey, Jr. 38 Humphrey, Mrs. Anna L. 342	N Nilan, J. A•484	V Viessman, Warren 681			
Counor, John 842 Cooke, M. W. 522 Couzens, James. 96 Crouse, Huntington B. 1055	Jackson, David H	O'Brien, R. J	Wagner, Herbert A. 562 Wales, Fred A. 566 Wallace, H. U. 303			
D Dabritz, Maxwell 182 Dana, Edward 134 David, Thomas H. *523 DeHore, Charles T 1094	Jagoe. Rnbert 303 Jonson. Nels 422 Johoson. H. Stewart 966 Jones. Warren H. 142	Palmblade, R. F	Ward, J. H. 342 Warner, Charles A. 1054 Wells, George W. *35 Welsh, G. W. 261 Wenger, Harry V. 522			
Desautels, J. C. 140 Doolittle, F. W. 261 Downs, Edwin E. 564 Drake, W. V. 182 Drexler, Norman E. 221	K Keating, Raymond B. 842 Keenan, Frank J. 757 Kelley, R. W. 484 Kennedy, Walter W. 484	Palmer, W. S. 421 Parke, Frederick Huntington. 1094 1094 Phares, C. C. 881 Phillips, E. L. *1013 Pick, Frank 601 Pike, R. J. 758	Welsh, G. W. 261 Wenger, Harry V. 522 Westover, Myron F. 484 White, J. W. 183 Whitsell. Leon O. 161 Willoan Dr. Delos F. 601 Williams Alonzo R. 221 Wilmot J. F. 222			
Drum, A. L	Kelley, R. W. 484 Kennedy, Walter W. 484 Kenney, T. A. *1093 Kidd, George 1054 Koch, R. W. 563	Porter, C. D. *182 Porter, George Grant 282 Potter, H. B. 681 Potter, J. B. 101 Preston, Homer M. 641	Wilmot, J. E. 222 Winslow, Wadsworth 382 Witt, Peter 1048 Wood, William E. 95 Wood, William O. 382 Woodard, H. J. 421			
Esch, John J	· L	R	Woodard, H. J. 421 Woods, Robert P. 141 Wyatt, Richard H. 841			
Faber, H. V. 641 Fanning, G. R. 472	Larkin, Ben C. 641 Lemaster, Earl		Y Yount, J. M			
READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX						

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX Abbreviations: *Illustrated. c Communications.

ELECTRIC RAILWAY JOURNAL

raw-Hill Publishing Company, Inc.

JANUARY 7, 1928

Twenty Cents per Copy

Meeting Every Demand of Electric Railway Service

White Trucks have been used by electric railways since the earliest days of motor truck transportation. Years of success in meeting every test in the most extreme emergencies and in routing work have established their right to be regarded as the most dependable and economical trucks for every phase of electric railway work.

Because of their dependability and economy, White Trucks and Busses are serving more than 200 electric railways in every section of the country. 51 of these railways operate 2,109 Whites in fleets of 10 or more. There is no question about White leadership in the electric railway field.

THE WHITE COMPANY, Cleveland, Ohio



WHITE TRUCKS

AND WHITE BUSSES



W-N Drive Installation

W-N Drive advantages

Lowest steps
Faster acceleration
Quiet operation
Motors spring borne
Gears run in oil
Greater clearance
Lighter weight
Lower maintenance

"We Will Underwrite the Securities"

WHEN bankers sit in judgment on a refinancing plan, they want absolute assurance of success—especially increased business and lower operating costs.

The new W-N Drive has put in the hands of electric railway officials the strongest argument on refinancing that has been made to bankers for years.

It overcomes the handicaps that have been holding back the street car industry for a decade.

The low steps, quiet operation and fast acceleration of the W-N Drive car put it on a par with the automobile and make it superior to the motor bus as an attractive means of transportation; its light weight and low cost of maintenance produce a substantial reduction in operating costs.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

the United States and Foreign Countries



MORRIS BUCK Managing Editor JOHN A. MILLER, JR. Associate Editor CLARENCE W. SQUIER Associate Editor

BURGIRIG RAIDWAY

CHARLES GORDON, Editor

HENRY W. BLAKE Senior Editor GEORGE J. MACMUR News Editor PAUL WOOTON Washington Correspondent ALEX McCALLUM Editorial Representative London, England

CONTENTS

Pages

JANUARY 7, 1928	
Editorials	1
Surface Rapid Transit Line Operated in Detroit Street cars on Jefferson Avenue give 18 m.p.h. service by running express with stops nearly mile apart. Local service provided wis supplementary buses. All traffic on street expedited by elimination of frequent car stops.	ıg th
Light Construction Features European Overhead By Kent T. Healy. By use of pantographs of light weight and low inertia withinged shoes a much cheaper type of overhead and supporting structures is used than is practicable with heavy pantographs.	th
Pico Street Viaduct Dedicated	10
Rectifier Superior to Converters on North Shore Line 1 By CAESAR ANTONIONO.	1
Operating results of mercury-arc rectifier show higher efficience simpler operation, less maintenance cost and other advantage Five months actual figures indicate reliability in service has been attained.	s.
Birmingham Believes in Advertising Its Service1 Coffin brief of Alabama company shows that it uses a great varety of means for bringing the merits of car riding to the attention of its public.	i-
Articulated Cars Meet Unusual Requirements	ce
Readers' Forum	:0
Maintenance Data Sheets	1
Association Activities	5
American Association News	5
News of the Industry2	6
New York Governor Discusses Home Rule and Buses 2 Traction Not Included in Illinois Session 2 Continuation of Public Control Urged 2	26
Recent Bus Developments	0
Financial and Corporate3	1
Legal Notes3	4
Personal Mention	5
Manufactures and Markets	-

Next Week— The Facts

TEXT WEEK'S issue of ELECTRIC RAILWAY JOURNAL is the Annual Statistical Number. Here will be assembled in tables, charts and diagrams statistics of electric railway activity brought right up to date for the year just closed.

Here will be the record of the year's operations, furnished by the companies that comprise the industry. In addition to the figures for 1927, activity for 1928 will be forecast from the actual budget estimates of operating companies.

What is your special interest? Track? Rolling stock? Buses? Financial? Don't miss the Annual Statistical Number next week! It will contain the facts you need.

McGRAW-HILL PUBLISHING COMPANY, INC. Teath Avenue at 36th Street, New York, N. Y.

New York District Office, 285 Madison Ava. New York District Of James H. McGeaw, President James H. McGeaw, Jr., V.-P. and Tress. Malcolm Muis, Vice-President EDWARD J. Memens, Vice-President Mason Bettron, Vice-President EDOAR Kobar, Vice-President C. H. THOMPSON, Secretary Cable Address: "Machinist, N. Y."

WASHINGTON: National Press Building

National Press Duminion CHIGAGO;

7 S. Dearborn Street
PHILADRIPHIA;
1600 Arch St.
CLEVELAND;
Guardian Building
ST. LOUIS:
Bell Telephone Building
SAN FRANCISCO;
882 Mission Street
LONDON;
LONDON;
LONDON;
LONDON;
LONDON;

Publishers of

Publishers of

American News-Record

American Mochinist

Power

One Age

Engineering and Mining Journal

Ingenieria Internacional

Bus Transportation

Electrical Roikway Journal

Electrical World

Hiertrical Merchandising

Radio Retailing

Construction Methods

Electrical West (Published in Son Francisca)

Change of Address. When change of address is ordered the new and the old address must be given, cotice to be received at least ten days before the change iskes place. Copyright, 1928, by McGraw-Hill Publishing Company, Inc. Published weekly. Entered as second-sizes matter, June 22, 1808, at the Post Office at New York, N. Y., under the Act of March 2, 1812. Printed in U. S. A.





Braking

Double the Braking Area—

Double it—and you decrease over 50% the required energy absorption per brake shoe.

Double the braking area and you greatly increase the friction coefficient.

Double it and you can attain a higher rate of retardation.

Double it and you decrease the frequency of brake shoe replacements.

The "SIMPLEX AND AMERICAN MULTIPLE UNIT" clasp brakes with two brake shoes per wheel instead of one, doubles the braking area and accomplishes these results.

AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST.LOUIS

American Multiple Unit Clasp Brake





ZP Special

A recess mounted headlight for city cars. Crystal or gold ray prismatic glass reflector give maximum pick-up distance and a diffused beam that illuminates both sides of track. Adjustable ocket takes lamps from 23 to 94 watt. Casing is pressed steel, weather and dust proof. Lock or spring catch optional.



Type WDF

A city and suburban service headlight for recess mounting. Furnished with crystal or gold ray glass or nickle plated coper reflectors. Can be used for dimming in congested districts and with bright lights for outlying districts where streets are poorly lighted. Lamp is adjustable for focusing. Casing is Armco Iron, alloy coated and black enameled. Lock or spring catch optional.



Type DCP

A portable headlight for high speed interurban cars. 500-watt lamp in mogul base, and 11-in. dia. crystal ray glass or nickle plated copper reflector, produce maximum in incandescent track illumination. Also furnished with medium screw base for lamps of 250 watts or less. Has two-way focusing mechanism. Form C Resistance. Uses



ation—with more efficient use of power and

air—is one of the service economies that results when headlights afford good track illumination. Lower maintenance charges on the headlight itself is another saving made possible when the headlight selected is designed and built to fit your particular type of service.

you give riders faster service. For speed is today the most important factor in selling more

adequate headlights-correct illumination of

Look to your headlights for lower operating

and maintenance costs, too. Better car oper-

both car and right-of-way—are essential.

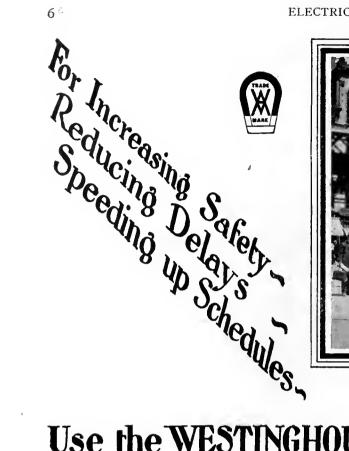
And to combine speed with safety,

On the next headlight order, specify O-B Imperials. Assure yourself of all the advantages that only years of specialization in making headlights give. O-B Imperials are available for every operating condition, for every type of car. Complete particulars sent without obligation on request to

> Ohio Brass Company, Mansfield, Ohio Dominion Insulator & Mfg. Co., Limited Niagara Falls, Canada

SALES **NEW YORK PHILADELPHIA** PITTSBURGH OFFICES: CHICAGO SAN FRANCISCO LOS ANGELES

PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS AR EQUIPMENT MINING MATERIALS VALVES





Use the WESTINGHOUSE Variable Load Brake

This improved brake equipment increases operating safety because it affords the same degree of retarding force on loaded cars as on empty cars—automatically.

It reduces delays because the capacity to stop quicker prevents cars from being crowded out of position in traffic lanes by other vehicles.

It stimulates better schedules because the consistently short stops allow longer peak speed operation before deceleration begins.

Twenty-five prominent traction properties are now utilizing the advantages accruing from Westinghouse Variable Load Brakes to improve their transportation service.

The Variable Load Brake automatically adjusts brake cylinder pressure as the car weight changes to provide the same retarding effect throughout the range of passenger loading.

> WESTINGHOUSE TRACTION BRAKE CO. General Office and Works, Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES

It will take only 20 seconds to read this advertisement. It will be worth your while to do so.

STRAIGHT TALK ON TIES

HERE'S just one reason for using Steel Twin Ties—they increase the operating profits of your system.

How do they increase them?

Because they insure a smooth road bed for your cars to run on, increasing rider appeal and decreasing car wear. Because they last longer than wood ties, decreasing replacement costs. Because they hold the rails permanently in place, showing no deterioration, decreasing maintenance costs. Because in every way they are better and cheaper than wood ties.

Can you think of any reason why you should not increase the profits of your system? Write today for delivered prices for your 1928 program.

THE INTERNATIONAL STEEL TIE CO. Cleveland, Ohio

STEEL TWIN TIE TRACK

THE BASE OF MODERNIZATION



Automatic Signals by providing proper spacing of cars or trains, reduce trip time and enable more cars to be operated with consequent safety.

Interlocking installations at terminals and at grade crossings eliminate unnecessary stops and assure route continuity by means of signal indications.

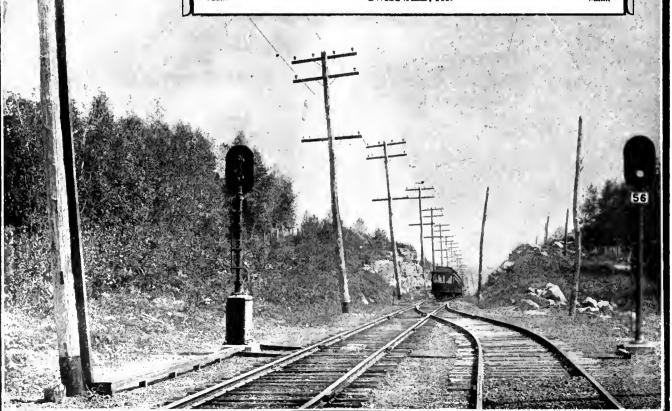
Highway crossing protective devices of the flashing light, automatic flagman, or audible type, or combination of same, are a dependable insurance which soon pays off the investment.

Power operated remotely controlled switches are being used economically to accelerate Electric Railway traffic.

These Systems are products of the



Union Switch & Signal Co. Swissvale, pa.





and To-day:

Start—slow down—speed up—slow down—speed up—slow down-ad infinitum. All because at night the motorman couldn't see what was on the track ahead for the distance of more than a few feet. He wasn't taking any chances—and you couldn't blame him for being careful. But the passengers want to get somewhere at faster than a snail's pace.

Nowadays there's no trouble like that for the motorman can speed along at night in perfect safety—when he's driving behind a Golden Glow Headlight. It easily penetrates fog, mist, rain and other contingencies that are added to the darkness of night. It's a real safety factor in night operation.

Other ride-selling items of our complete line of Keystone Car Equipment are described and illustrated in Catalog No. 7. Write for your copy today.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA: District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bidg., Pittsburgh; 88 Broad St., Boston; General Motors Bidg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.



Golden Glow Headlights
Equipped with the justly famous Golden Glow mirror glass reflectors which offer a permanent reflecting surface due to the qualitles of the greenish glass used, they project a golden light which is less blinding and much more penetrating in fog and snow than is a brilliant white light.

In city types the permanency of the Golden Glow glass reflector is offered, but is a prismatic type, so that a short wide beam of high intensity is secured.

ELECTRIC SERVICE SUPPLIES C MANUFACTURER OF RAILWAY, POWER INDUSTRIAL ELECTRICAL MATERIAL





The sweeper is easily and quickly converted to a utility truck for construction or emergency purposes, by removing the broom and rear cab, and substituting a material body, thus giving year-round service.

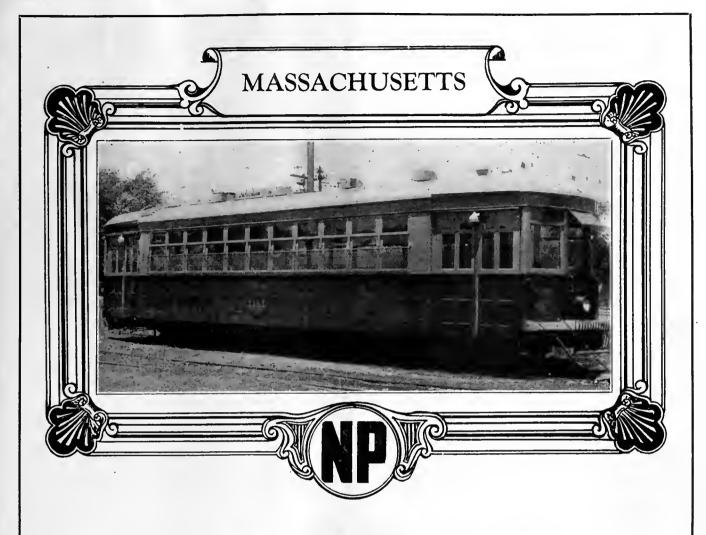
The Gas-Electric Snow Sweeper

Is a mobile, powerful unit of equal value in clearing car tracks or bus routes of snow. It is of special advantage in removing snow from tracks in front of car barns, or emergency work, freeing stalled cars, etc.

The gas-electric drive gives great flexibility of control, a wide range of speed, and independent control of broom speed. When operating the broom, the sweeper is driven from the rear cab, with broom foremost.

Designed and built by

CUMMINGS CAR AND COACH CO. CHICAGO



SPRINGFIELD TAKES TO TREADLES

FIFTY-ONE cars have been ordered or have been equipped with treadle doors within the last 12 months for Springfield, Mass. Treadle Doors are new in Springfield, yet they have already demonstrated their value as time savers.

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works, Rahway, New Jersey
MANUFACTURED IN TORONTO. CANADA. BY
Railway & Power Engineering Corp., Ltd.

FOUR "STANDARD" FACTORS



Longer Periods Between Renewals
Lower Repair Costs
Dependable Uninterrupted Service
Safety at all Times



Let these factors be your guide in the selection of—

Steel Axles
Steel Springs
Armature Shafts
Rolled Steel Wheels

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

WORKS: BURNHAM, PA.

CHICAGO NEW YORK ST. LOUIS HOUSTON, TEXAS BRANCH OFFICES:
PORTLAND, ORE. SAN FRANCISCO
RICHMOND, VA. ST. PAUL, MINN

SAN FRANCISCO PITTSBURGH, PA. ST. PAUL, MINN. MEXICO CITY

The COST of the Magnetic Brake is negligible when considered as insurance



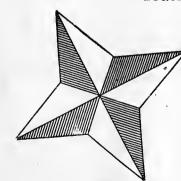
The maintenance cost on the Magnetic Brake equipment on a famous Southern property, for the three months of June, July and August, 1927, averaged \$1.20 per car.

During this time motormen's reports showed that at least 18 accidents had been averted.

Even admitting that most of these would have been minor accidents, the cost of the Magnetic Brake protection is negligible compared with the probable amount of claims that otherwise would have been filed.

May we go into this matter with you more thoroughly? The installation of the Magnetic Brake is not expensive, and it can be applied to the modern rolling stock you now operate.

Remember, too, that the Cincinnati Duplex Air and Magnetic Brake is one of the important features of the Cincinnati Balanced Lightweight Car, and is an integral part of the new Cincinnati High Speed Truck.

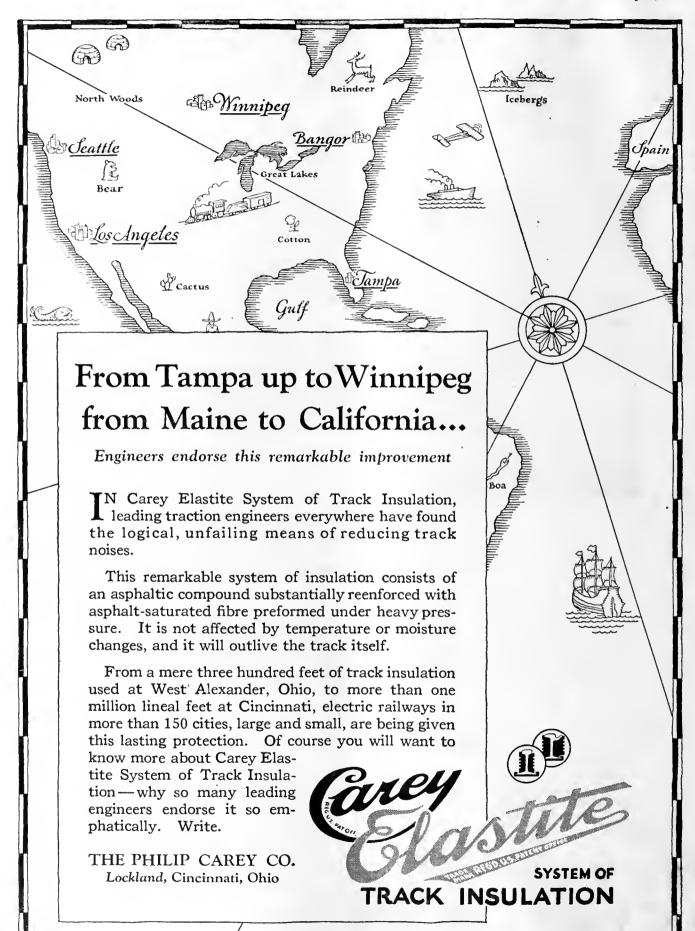


CINCINNATI CAR COMPANY CINCINNATI, OHIO

The Four Features of
Balanced Design are
the Cardinal Points of
today's demand

CINCINNATI BALANCED CARS

-still a step ahead of the modern trend!



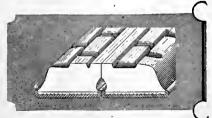


To operators of motor buses, who must in addition buy equipment for trucks, it is sufficient to say that U. S. Truck Tires are produced by the same organization and have behind them the same resources of engineering skill and manufacturing ability as the U.S. Motorcoach Tire.

For maximum cushioning of the truck and its load, U. S. HOLLOW. CENTER CUSHIONS are, by far, the most successful tires on the road today.

The well-known cushioning qualities of the hollow-center tire have been enjoyed in the U.S. Cushion Tire for years. Today, these same advantages are also available in the U.S. Twin Cushion-in widths from 8 to 16 inches. Maximum cushioning. Adequate carrying capacity.

United States Truck Tires



Cross-section of the U.S. Twin Cushion showing how the hollo v-center principle is applied to tires in the wider sizes.

U. S. Royal Cord Heavy Service U.S. High-Size Cushion U.S. Cushion U.S. Twin Cushion U.S. Demountable Cushion U. S. Industrial Truck Tires

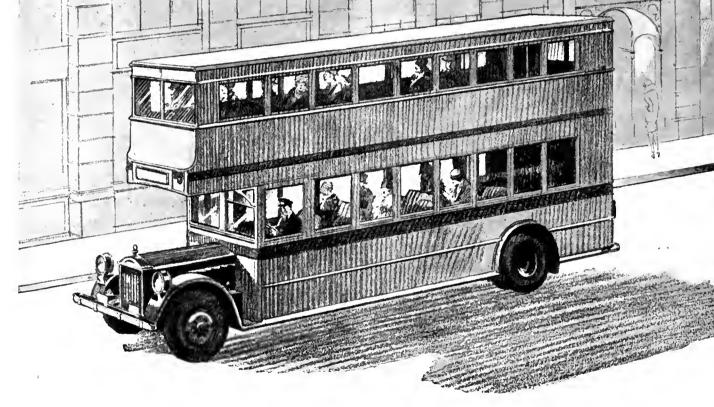




Cross - section showing the hollow-center construction of the U.S. Cushion. Made in widths from 4 to 8 inches.

A STANDARD SIZE OF





GENERAL FLECTRIC COMPANY, SCHENECTADY, N. Y.



Gas-Electric Drive has so increased bus speed, bus mileage, and bus safety, and has so reduced bus depreciation that this equipment is now made in three standard sizes for:

1—Light-duty, four-cylinder buses of 10- to 18-passenger capacity for city and interurban service.

2—Medium-duty, four- or six-cylinder buses of 18to 25-passenger capacity for city and interurban service.

3—Heaviest types of six-cylinder buses—both single and double deck—for city service.

Gas-Electric Drive can also be used on 1- to $2\frac{1}{2}$ -ton trucks. Full particulars can be secured from your nearest G-E sales office.



390-20

ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES



for the GE-265 Motor

This gear case possesses a unique feature—an overlapping joint, something new in malleableiron gear case construction.

Overlapping of the halves keeps out dirt and moisture and affords a means of making adjustments to compensate for any wear of the supporting brackets.

This new gear case embodies the acknowledged advantages of malleable iron-rigidity and strength -yet its weight is no greater than that of the gear case formerly used with this modern lightweight motor.



General Electric is always striving to produce the most satisfactory railway equip-ment, as demanded by changing conditions and improvements in the in-dustry. This new development, which makes possible the use of malleable-iron gear cases with GE-265 Motors, is a typical example.



Modern Equipment Standards

GENERAL ELECTRI

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company. Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, January 7, 1928

Number 1

ELECTRIC RAILWAY JOURNAL is a consolidation of Street Railway Journal and Electric Railway Review, effected in 1908.

In November, 1884, Street Railway Journal began publication, having been started a few months earlier as the street railway department of the Journal of Railway Appliances. The new paper was edited during various periods by Robert Grimshaw, George L. Fowler, Emerson P. Harris, C. B. Fairchild and Edward E. Higgins.

In May, 1908, Electric Railway Review was purchased and consolidated with Street Railway Journal to form Electric Railway Journal. Henry W. Blake, who joined the staff of Street Railway Journal in 1891 and in 1894 became its editor, continued as the editor of Electric Railway Journal until 1925, when he was made senior editor. Harold V. Bozell was co-editor from 1920 to 1922 and Harry L. Brown was co-editor from 1923 to January, 1925. Charles Gordon became editor in February, 1926.

The present staff is as follows: Editor, Charles Gordon; managing editor, Morris Buck; senior editor, Henry W. Blake; editorial staff, John A. Miller, Jr., Clarence W. Squier, George J. MacMurray, G. W. James, Jr., C. A. Faust and L. H. Church (Chicago). Paul Wooton is Washington correspondent and Alex. McCallum is London editorial representative.

A Demonstration of the Good Business of Good Service

ANALYSIS of the progressive program followed by the Georgia Power Company in its effort to give Atlanta "The Best in the Nation" in transportation service was published in last week's issue of the JOURNAL on page 1180. The opening paragraph of that article said:

Confident that new cars and, therefore, better service are the real answer to increased revenue and the ultimate support of the public, the Georgia Power Company, Atlanta, Ga., and its predecessor company, the Georgia Railway & Power Company, have been buying cars steadily since 1921, in the face of a declining curve of earnings on the investment. Some idea of the extent to which the present company believes in better service is gained from the knowledge that it has spent over five million dollars in service improvements since 1921, and the budget for 1927 adds more than a million and a quarter dollars to that already invested.

It is an unusual coincidence that in the same issue of the Journal, on page 1201, there is published an abstract of the opinion and order by the Georgia Public Service Commission granting the Atlanta company a fare schedule of 10 cents cash, four tickets for 30 cents, or twenty for \$1.50. In support of this fare order the commission points out that the company is rendering the best railway service in its history. There was little organized opposition to the fare increase in the hearings before the commission.

Here, then, briefly is the history of what has been

happening recently in Atlanta. It represents one of the brightest pages in the record of the march of electric railways toward better days. It is of more than passing interest, therefore, to look behind the record itself for the policy which has guided this company's management during the past several years. One does not need to look far. In the introduction to its brief filed last year in the Coffin competition the company sets down this policy under the heading, "Our Story at a Glance":

A determined effort to give Atlanta the "Best in the Nation" in transportation service, in the confidence that this would win public patronage and support.

public patronage and support.

Continuation of this policy for several years in spite of the fact that losses not only continued but increased—and then in 1926 an upturn in the curve of return on the investment!

That was Atlanta's creed. The management expressed and demonstrated its confidence that the public would patronize and support its service if the service was of sufficiently high quality to deserve patronage and support. It hung to this policy and continued to make large investments in new facilities over a period of several years, while losses not only continued but actually increased. It drew comfort at last from the fact that there was finally shown a slight increase in the return on the investment. But the recent commission order now demonstrates the soundness of the company's policy to the owners of its securities and to the industry in so convincing a manner that even the most skeptical and faint hearted must be convinced.

The Journal extends its sincere congratulations to the Georgia Power Company. Atlanta enjoys no special advantages in comparison with other cities. What has been done there can be duplicated on many other properties. The Atlanta story portrays a brand of management courage and vision of which the electric railway industry can well use a large portion. Here is faith in the transportation business that serves as a shining beacon to those who have looked on the future with doubts and misgivings. Here is a demonstration of the good business of good service.

A \$40,000,000 Program for the Boston Elevated

If the program of the Division of Metropolitan Planning of the Metropolitan District Commission at Boston is approved by the Legislature the status of the Boston Elevated Railway will be changed greatly. In the first place the division favors the expenditure of \$40,000,000 for two new rapid transit lines and for the extension of the Washington Street rapid transit route. This is all presaged, of course, on the extension of the public control act. The division would extend the period of public control for fifteen years, but it would modify the terms.

Both of these matters were before the state legislative body in 1927. No disposition was made of them then, but enabling legislation has since been secured which is deemed advantageous under the present conditions. Moreover, the Supreme Court has decided that betterments may be assessed against property benefited by rapid transit line extensions.

Under the plan now advanced the name of the company would be changed to the Boston Transit Company so as to be more nearly indicative of the real status of the enterprise. The financial set-up of the company would be changed, with certain bonds carrying the guarantee of the state. Not the least interesting of these proposals is the suggestion that the three classes of preferred stock now outstanding be exchanged for 4 per cent income bonds, it being felt that a 4 per cent tax-free income bond with a guarantee of the commonwealth can be sold at par and offers a suitable medium of exchange for the holders of the various classes of preferred stocks. The investment plane to which the securities of the company have risen under the plan of operation by the trustees is attested by the market quotations, particularly of the first preferred stock, which is selling at 113.

So far as the company is concerned the changes suggested would save \$1,175,000 a year on the basis of its present capitalization and earnings. The plan also provides for the liquidation of the \$2,200,000 now owed by the Elevated to the cities and towns served by it and advanced through the commonwealth to the company to meet the guarantees of the public control act when its earnings were insufficient.

The plan, of course, is tentative. It may or may not be modified in its essentials. One thing it does do, however. It makes distinctly articulate the demand from some quarters that the essentials of the plan of operation which has been in effect for the last ten years be perpetuated.

But these ideas merely reflect the thought of one group of partisans. As a matter of fact, with regard to the control of the Boston Elevated property, three schools of opinion are coming to the front: (1) A group advocating the return of the property to private management under the commission regulation imposed upon other utilities; (2) a group seeking immediate public ownership of the road through purchase from the stockholders, and (3) an extension of the public control period under a plan which would probably require the stockholders to accept a lower dividend return than that guaranteed by the act of 1918.

Only a few days ago Eliot Wadsworth, formerly of Stone & Webster and latterly Assistant Secretary of the U. S. Treasury, issued a pamphlet in which he made out a strong case against the continuance of state trusteeship and vigorously advocated a return to private management. He pointed out that the property has been self-supporting for seven years; that it can and should be run in the future on the principle of service-at-cost, and that this can be done without further commitment of the state treasury to making up operating deficits, which amounts to giving the trustees an unlimited expense account through their right to levy taxes on the metropolitan district.

Mr. Wadsworth maintains that the need of the public control act of 1918, passed under war conditions, has long since vanished; that the trustee plan has failed as a method of money raising, and that much-needed extensions of the Boston subway system are practically impossible under existing conditions. The improvement of service under public trusteeship has been largely due to the establishment of adequate rates, and it is held that

under private management and state regulation progress will be even greater. It is declared that a continuance of trusteeship threatens private management of utilities and is obnoxious to the broad principles of businesslike administration which are associated with utility development in this country.

His is a point of view that it is not easy to dismiss. After all, belief in the policy of private development under commission regulation is general. There is little doubt that the administration of the Boston electric and bus transportation system under the act of 1918 has been unusually high-minded and public spirited; that without a radical increase in rates, and perhaps also without the use of the public credit, financial disaster would have overtaken the property. Fundamentally, of course, public management is open to objections of the gravest character from the standpoint of American institutions. One thing Mr. Wadsworth has done. He has made articulate the demand of those who seek the restoration of a program designed to give the fullest scope to private enterprise accompanied by the long-established safeguards of commission regulation in the field of public utility development.

Mercury-Arc Rectifier Gives a Good Account of Itself

DATA on operation of a mercury-arc rectifier installed on the Chicago, North Shore & Milwaukee Railroad have now been obtained over a period of several months. In general they indicate that in several respects this device is superior to the synchronous converter. The data, which were obtained by Caesar Antoniono, electrical engineer of the company, are included in an article by him appearing in this issue.

The advantages given by the author include high efficiency, simplicity of operation, low maintenance cost, reliability of service, high capacity to absorb momentary overloads, freedom from noise and vibration in operation, insensibility to short circuits and absence of synchronizing. The statements made in the article are based on actual experience over a period of five months of automatic operation following about a year while the station was operated manually. The conditions imposed on the rectifier were similar to those imposed on the five synchronous converters with which it has been compared.

The high efficiency obtained is particularly important in view of the low load factor. For the five synchronous converters the grand average efficiency was 73.4 per cent, while for the rectifier it was 81.7 per cent, a gain of 8.3 per cent. The author believes the comparison is fair, even though it was not exactly correct on account of exclusion of power consumed by the automatic devices.

More auxiliary devices are used with the rectifier than with the converter. Even so, the experience on the North Shore Line is that the rectifier is simpler to operate and has required less attention than the converters. Brushes, commutators and slip rings, which usually require attention, are absent, and the ventilation is simpler. No maintenance cost data are available for the installation, but it is the belief of the operators that this item will be less than for the converter. The only maintenance so far has been the regular weekly inspection and oiling.

As to reliability, Mr. Antoniono stated that the automatic rectifier station is as reliable as the average 60-cycle converter station of like capacity, or more so. This is supported by records of shut-downs over a period of

twelve months while the rectifier was attended and five months since it was made automatic. During this period the rectifier was out of service for trouble inherent to itself only 0.435 per cent of the total time. It is quite a commentary on reliability that failures of auxiliaries caused a loss of 0.674 per cent of the total time. Many of these, such as a chain break or a motor burnout, might have been avoided. Of course, the auxiliaries were neglected during the period of the test, for the operator's attention was directed principally to the rectifier itself. A study of the records obtained with a synchronous converter of similar rating indicates that the troubles with the rectifier itself probably will be less serious than those of a modern converter. Flashovers, which are likely to cause extensive repairs in the converter, are entirely absent.

It is significant to note that the author has great confidence in the converter. He predicts that it is here to stay and in ten or fifteen years will have a large use supplementing the converter. This prediction will bear watching by every power engineer.

Lighter Overhead Favored in Europe

BUILDERS of heavy current collection systems in the United States will find much to interest them in a study of light overhead, supporting structures and pantographs employing low pressures. The extensive use of light overhead in Europe, as described in an article appearing elsewhere in this issue, has been prompted by the many advantages the operators there find for it.

Lower original cost and lower maintenance cost effected by the lighter construction are the two main advantages held. Since from 25 to 35 per cent of the total cost of electrifying a railroad is in building the overhead system, any reduction in the cost of this important element would be a substantial saving.

Maintenance costs of both the overhead and the pantograph, at least under European conditions, has been found less with the use of a lighter system. The lower pressures necessary reduce the wear of the contact shoe materially. Likewise, the wear on the overhead conductors is reduced.

Use of an auxiliary bow on the pantograph to support the contact shoe is another European practice that has proved a success. The bow, being flexible and swinging through a short arc, easily follows minor irregularities of elevation in the contact wire. In turn, this permits the use of lower pressures in the main pantograph. In America the type of pantograph generally used has a heavy framework, with the collecting shoe hinged directly to it. Heavy pressure is essential, as the entire weight must follow even the slightest irregularities in order to maintain contact. Because of the high inertia of the heavy framework, where there is any irregularity in the contact wire the proponents of the European system believe that collection is not as uniform as with the lighter pantograph using an auxiliary bow.

With high pressures harder contact shoes are needed to prevent excessive wear, and in turn these hard shoes and the high pressures jointly cause excessive wear on the contact wire. Heavy pantographs also must have sturdy pin joints. If these are loosely fitted to reduce friction, there is side swaying and a consequent reduction in the effective width of the shoe. If they are tightly

fitted, there is a considerable added load and reduced flexibility.

Even without auxiliary bows the lighter pantographs have proved more satisfactory in Europe than the heavy ones. The use of roller bearings makes the whole structure very flexible and permits good collection. Operators in Germany, Austria and Switzerland even find it unnecessary to use intermediate trolley wires to give flexibility. Just as the heavier overhead for the collection of high-voltage alternating current is favored in America, so is the lighter construction favored in Europe.

Novel Advertising Ways Attract Business

MANY years ago a railway manager said he did not see any reason for advertising street railway service. He considered that as street cars are very conspicuous objects on the street, they are their own best advertisements and need no other. This remark was made when the need of the utilities for publicity was not as well understood as at present. Now, with more competition than ever before, railways realize the necessity not only of advertising the advantages of car riding over other means of transit but also of explaining to the public at large some of the special problems of the electric railway business. Hence, notes on advertising campaigns which have gained results are worth while.

Such a campaign has been conducted for several years by the Birmingham, Ala., electric railway system, a feature of whose advertising is the extent to which it is carried on the cars themselves. Other mediums are used, of course, such as the daily papers, moving pictures, signboards and even, to some extent at least, direct solicitation. But the railway takes its own medicine by advertising extensively on the cars themselves. In the opinion of the company this is the most effective of all.

As explained in an article elsewhere in this issue, the spaces thus taken are not those which are utilized for the usual commercial car cards. In fact, the cards are in space which ordinarily would not be so used, such as the deck windows.

These window and dash signs might appear obtrusive if employed for commercial advertising. But when they are used to carry some good will or safety message or traffic announcement of the company no one can object. This plan also permits all of the usual spaces for commercial cards to be used for that purpose. It does not cut down the revenue of the company. It also separates the advertising done by the company from that done for its clients, the car card advertisers.

The practice of direct solicitation for car riding followed in Birmingham is even more rare. It is employed, of course, by the central station light and power companies, but is usually considered not worth while in railway work as the amount charged for a car ride is very small compared to that paid for an electrical installation. This objection may hold for regular solicitation. It does not apply where the business of an entire family can be won by a single call. With several members in the family, its carfares for a month might easily be greater than its electric light bill for the same period.

This is the warrant for a personal call in railway solicitation when a new line or service is begun. It is also sufficiently novel to attract attention. Strange, indeed would it be if the interest of the railway in the transportation business of the family visited did not

result in comment favorable to the management.



Two-car express train approaching station on Jefferson Avenue surface rapid transit line in Detroit

Surface Rapid Transit Line Operated in Detroit

Street cars on Jefferson Avenue give 18 m.p.h. service by running express with stops nearly mile apart. Local service provided with supplementary buses. All traffic on street expedited by elimination of frequent car stops

ORE than three months of experience with an experimental line on Jefferson Avenue, Detroit, indicates interesting possibilities in the idea of combination express and local transportation service with cars and buses on city streets as a means of providing rapid transit without the heavy investment required for subway or elevated line construction. The Detroit experiment is an attempt to increase the speed and efficiency of surface transportation on a heavy traffic artery by running street cars on an express schedule of more than 18 m.p.h., making only five stops in a distance of 4.15 miles. Buses handle the passenger traffic originating and terminating at intermediate street intersections. transfers between the two vehicles enable passengers to use the combined service of cars and buses from their point of origin to destination, much as they would use the express-local service on a four-track rapid tran-

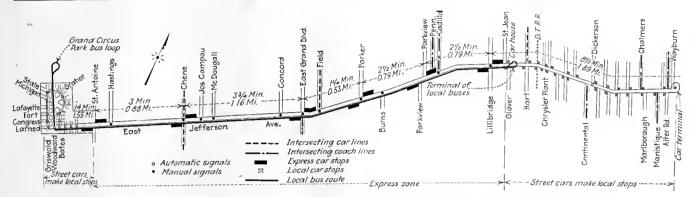
Jefferson Avenue in Detroit is a main traffic artery running in a north and east direction from the business district. It is approximately 7 miles in length from its downtown terminal to the outer end of the car line. The average width of the street in the express zone is about 90 ft. from curb to curb. Repair work and other obstructions, however, narrow this pavement in some sections to 60 ft. Prior to the introduction of the present express service, the cars running on Jefferson Avenue made

about six stops to the mile outside the business district. The average schedule speed on the line was less than 12 m.p.h.

SPEED OVER 18 M.P.H.

Express operation commenced on Sept. 18 with the inauguration of a schedule which calls for an average speed of 18.4 m.p.h. in the express zone. Beginning at the city's limit, the end of the line, the street cars are operated on a local schedule for the first 1.89 miles, with actual stops averaging about three blocks apart. Inbound toward the business district the express zone following this local section is 4.15 miles long and is covered by the cars in $13\frac{1}{2}$ minutes. The former running time for this section of the line was $20\frac{1}{2}$ minutes. The remaining 0.7 miles of the one-way mileage is half of a loop in the downtown congested section and requires about seven minutes running time on the base schedule.

Car stops in the express area are spaced from 0.53 miles to 1.16 miles apart. This gives five runs with an average length of run of about 0.83 miles between express stops. The express zone speed of more than 18 m.p.h. is maintained easily even during the rush hours of the day. The average all-day speed for the entire line, including the local running beyond the express zone and in the congested business district, is approximately 14 m.p.h. This is being accomplished with two-car, motor-



Map of Jefferson Avenue express line showing location of stops and signals. The local buses terminate at the end of the express zone at Glover Street

trailer trains, using old equipment not designed for this class of service. The time saved by the introduction of the express service is between seven and eight minutes for the trip each way.

Jefferson Avenue is treated as a preferred traffic street. At the present time traffic signals at intersections are operated by hand. The signal for cross traffic is given just as a train comes into an express stop, and the clear signal is thrown when the train is ready to proceed. At intermediate intersections, between express stations, the crossing signals are operated so as to permit the express trains to move through without interruption. Experience has shown that this plan, while seeming to favor the movement of cars without regard to other traffic, actually expedites the movement of all traffic on the street. It is recognized, of course, that the plan of operating signals by hand is merely temporary, and studies are now being made to determine the best system of automatic signals for use with this express operation. It is probable that a "wave-control" system will be ultimately installed.

Buses Give Local Service

Dodge-Graham 21-passenger buses give a local service on the same street with the car line between the downtown business district and the last outbound express stop at Lillibridge Street. This makes the outer terminus of the local bus line approximately 1.8 miles from the extreme end of the car line, as shown on the accompanying map of the route. The local buses pick up passengers between express stops, or carry them to local stops after they have transferred from express cars.

Experience on the line gives several interesting facts regarding the preferences and riding confracteristics of the passengers carried. Approximately 10 per cent of the total car passengers use the combined ervice. This indicates, therefore, that the number of the required

to provide the supplemental local service is only a small proportion of the number required if all car passengers transferred to a bus to reach their destination. Approximately 50 per cent of the total passengers picked up by the local buses transfer to the express cars. The other 50 per cent of those carried by the buses either originate so close to the business district that they complete their journey on the local bus without bothering to transfer to the express cars, or both their origin and destination points are at local stops and the time saving offered by the express cars is not sufficient to offset the inconvenience of transferring from bus to car and from car back to bus.

Passenger volume on the Jefferson Avenue line on Monday, the peak day of the week, checked over a period of seven weeks, is approximately 37,200 revenue passengers per day. This gives an approximate idea of the density of the line. The base car service is supplied with fifteen single cars operating on four-minute headway. Running time in the base from the end of the line to the downtown terminal is 30 minutes inbound and 28 minutes outbound, with a two-minute layover. During the rush hours express service is provided with two-car trains operating on two-minute headways. Twenty-seven such two-car units are operated during the rush period. The express service is given between 5 a.m. and 9 p.m. Outside of these hours the coaches are taken off and the entire service on the street is supplied with street cars, making all local stops.

Makes Large Reduction in Cars Required

In comparison with the former local service on this line before the express experiment was started six trains have been taken off in the rush hours and four cars less are operated during the base period, to give the same headway as was formerly provided. The supplementary local bus service, during the period of express operation,



Local buses pick up and discharge passengers at the curb between express stops on the rapid transit car line



Buses run inside safety zones at express stops to provide convenient transfer to and from cars



Sketch showing proposed arrangement of street for Miller-Schorn plan, with center loading platforms and sub-surface cross passages

is given with 34 21-passenger Dodge-Graham buses. These buses operate from the outer express terminal and loop down through the congested business district, as shown on the accompanying map of the route. The average schedule speed on the local buses is approximately 9.94 m.p.h. A total of 3,204 coach-miles per day, or 388 coach-hours per day, are operated to provide the supplementary local service.

PROTECTED SAFETY ZONES AT EXPRESS STOPS

Safety zones at the express stops are of the type previously standard in Detroit, using protecting pipe railings. The zones are 88 ft. long, with upright stanchions erected $6\frac{1}{2}$ ft. from the track and spaced about 8 ft. apart. To afford shelter for passengers transferring between local buses and express cars, canvas awnings over the safety zones and splash guards around the sides have been erected.

Local buses pick up and discharge passengers at the curb. When arriving at an express stop, these buses run inside the safety zone either ahead or behind an express train, so as to avoid the necessity for transfer passengers to cross the traffic stream on foot between the curb and the loading platform. This arrangement was adopted temporarily as a means of trying out the express scheme without undertaking costly construction work to provide more permanent loading facilities at express stops. If the plan is ultimately declared entirely successful, adoption of the Miller-Schorn arrangement of express loading stations between the tracks in the middle of the street connected to the curb with pedestrian under-passes is contemplated. This, it is claimed, would take up less street area than the present outside

loading platforms on each side of the double-track line, but would require cars to be arranged for left-hand loading. If the Miller-Schorn plan is adopted, local buses would then discharge and pick up passengers at the curb line at express stations just as they do at local stops, the transfer to the loading platforms being made through pedestrian under-passes, as illustrated in an accompanying cross-section sketch of the proposed arrangement.

Unfortunately, for purposes of analysis, a number of variable and special conditions on the Jefferson Avenue line make it impossible to determine from study of the present service the feasibility of this express-local scheme for use on other heavy traffic streets in Detroit or other cities. Before the express plan was put into operation the Jefferson Avenue line was part of a through route

JEFFERSON AVENUE—LOCAL BUS OPERATION

Terminal to terminal Distance, 4.8 miles; time, 27 minutes; speed, 10.67 m.p.h.
Total bus-miles
Schedule
Payroll Bus-hours, 268.39. Speed, 10.37 m.p.b
Number of buses re uired:
Pase, fourteen

P. M. rush, 30 single deck, one double deck.

extending through the business district and out on Grand River Avenue, northwest from the center of the city. Simultaneously with the inauguration of the new service, the through route was cut in the business district, and through passengers are required to transfer at that point. This made a considerable difference in the travel habits on the line, and as a result it is almost impossible to get a direct comparison of costs and riding, to determine comparative operating costs and revenues in relation to

JEFFERSON EXPRESS SERVICE COMPARED TO PREVIOUS OPERATION

Service Local Express Local Local and express Local, express and local V	Lillibridge	State and Griswold		Street Cars Distance 1.89 4.15 .72 6.04 6.76	Former 91 201 8 30 38	Present 81 131 8 22 30	Former 11.90 12.14 7.20 12.08 10.67	Present 13.34 18.40 7.20 16.47 13.52
Pla	tform cost per mile	Base—4 P.M.—12	\$0.1250		Present 11.67 \$0.1111* autes, single c	ears. Pea	k two min	utes train _s

^{*} Includes 30 men per day used temporarily for extra station service and signal operation.

the old service. A further complication is produced by the fact that the Department of Street Railways formerly operated on Jefferson Avenue a double-deck 10-cent bus service, which has now been replaced with the small single-deck buses providing the local service for the express line and carrying passengers at 6 cents, the regular car fare, with transfers to and from the express cars.

INDEPENDENT BUSES AND JITNEYS COMPETE WITH LINE

Two independent competing transportation services are also operating on Jefferson Avenue. Double-deck buses of the Detroit Motor Bus Company on this street give a 10-cent service similar to that formerly provided by the Department of Street Railways. In addition, the street is infested with jitneys operated by private individuals. The combination of these two competitive services hopelessly complicates the problem of determining just how much the faster car service may be expected

One of the principal difficulties which attended the inauguration of the new service was the handling of crowds from several factories along the line. This situation was met by placing a number of "stand-by" buses at strategic points along the line to be used for the accommodation of these industrial employees during the peak period.

When the service was inaugurated guards were stationed at all of the express stops to expedite the interchange of passengers to and from the express and local units and to explain the details of the plan. Men in scout cars patrolled the express area to inform passengers of the boarding points for the new service. A number of the station guards are still retained during the rush hours.

SERVICE POPULAR WITH PUBLIC

On the whole, the service has proved popular with the riding public. The operation is at present carried on with little confusion. Comment by the press and the



Canvas awnings furnish protection for waiting passengers at express stops

to attract automobile owners to use the lines in preference to their personal cars.

During the experimental period normal traffic conditions have been considerably disturbed by extensive repair work on the street. Furthermore, the car equipment used for express operation includes some of the older equipment owned by the Department of Street Railways. Two-car trains consist of motor cars and trailers. This equipment does not develop the full possibilities of this service from the standpoint of speed, frequency or attractiveness to passengers.

Still another special condition, the nature and location of Jefferson Avenue as a traffic artery, interposes a difficulty in determining the feasibility of the express idea on typical surface trunk line streets. This street adjoins and parallels the Detroit River throughout the greater portion of the express zone. Very few intersecting streets cut through to the river and the problem of cross traffic is thereby largely eliminated.

Offers Attractive Possibilities for Faster Transportation

Despite the several special conditions found on this line, which make the Detroit experiment far from conclusive, and which also make it difficult to determine the possibility of applying this express-local idea to other heavy traffic arteries either in Detroit or other cities, the idea seems to offer attractive possibilities. To obtain full advantage of the express-local system in the way of expediting service, a system of subway dips in the heart of the business district is considered a logical ultimate step.

public has recognized the experimental nature of the present installation and has, on the whole, been quite favorable. There has been a notable reduction in traffic congestion on Jefferson Avenue resulting from the elimination of car stops. Although the total volume of vehicular traffic has increased considerably due to the speed with which the traffic stream moves on this street, there is little congestion, due to the fact that the express cars move along at the same rate as other traffic.

SIGNAL EXPERIMENTS BEING CONDUCTED ON STREET

In an effort to work out a plan of signal control which will avoid interference with the movement of express cars, while at the same time eliminating hand operation of crossing signals, experiments are being conducted with an automatic signal at Burns Street, in which the customary time-controlled signal is wired to a trolley contactor so that it will be thrown to clear the express line on the approach of a train and will return to automatic time-controlled operation when the train has passed the crossing. The conditions obtaining on the Jefferson Avenue line, however, are special, as it has comparatively little cross traffic. For this reason it will be difficult to determine the applicability of any control scheme adopted here to lines on other thoroughfares having heavy cross traffic.

One tendency which has been observed as a result of the expedited car service is that of passengers who drive private automobiles to express stops and leave them parked near by while they continue their journey to the business district by street car.

Light Construction

Features European Overhead

By use of pantographs of light weight and low inertia with hinged shoes a much cheaper type of overhead and supporting structures is used than is practicable with heavy pantographs

By Kent T. Healy

Consulting Engineer, Natick, Mass.



Two-track main line catenary and supports on the New York Connecting Railroad



Old style insulators are used on this German overhead system

ATENARY and pantographs in use on the various high-voltage alternating-current railroad electrifications of the world are of two very distinct types. These differ not only in the design but also in the cost of construction and maintenance. The first uses a heavy pantograph requiring a high pressure on the contact wire with resulting heavy catenary construction and heavy structures to support the overhead. The second type employs a light pantograph with an arrangement to give the contact shoe low inertia so the pressure against the contact wire will not have to be very heavy. This permits the use of a light flexible catenary system and lighter supporting structures.

The high-pressure pantograph design for high-voltage alternating-current distribution is found alone in America. Usually the pantograph for this system has a pipe frame with two pieces for each lower leg, a single upper leg and side cross braces for the upper section. Until recently all the joints were of the pin type, but now roller bearings have been introduced at the base joints. The sliding shoe is an integral part of the structure so that any movement of the shoe to follow irregularities in the elevation of the contact system causes a corresponding movement of the whole pantograph structure. This gives the contact shoe a high effective inertia and makes it slow to follow trolley irregularities unless the

pressure pushing it up is high. The high pressures demand a hard shoe to prevent excessive shoe wear, but this causes considerable wear on the contact wire. The pin type of joint requires a certain amount of play to keep the friction down and side swaying of the pantograph results. This, in turn, reduces the effective width of the contact shoe for safe use and necessitates accurate alignment of the catenary or else more trouble from the pantograph leaving the contact system will result. The pin joint is inefficient and the resulting friction may add as much as 6 lb. to the pressure of the raising springs.

LIGHTER PANTOGRAPHS HAVE INDEPENDENT SHOE SUPPORTS

A much lighter pantograph is used on the European high-voltage alternating-current electrifications. Both its lower and upper legs are made of pipe with a cross bracing either of wire or pipe. A feature of the European type is the independent support for the contact shoe. This support is in the shape of a bow and extends approximately 1 ft. above the main body of the pantograph. It is free to rotate about the axis of the upper cross rod and normally is held in a vertical position by small springs. When in motion, mechanical resistance against the trolley tends to make the shoe move about its axis so that the bow is not vertical, but on a slant. In this

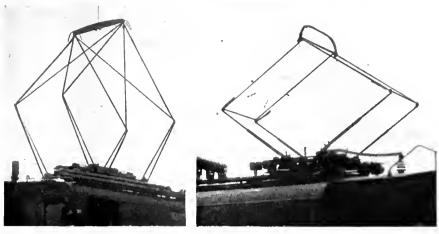
position any minor irregularity in the height of the trolley is taken up by the rotation of the shoe and its bow about the axis. The resulting inertia is almost negligible as far as movements are concerned, since the inertia is dependent only on the weight of the bow and shoe and the resistance of a single joint. Consequently, constant contact with the trolley at high speed can be maintained without sparking. Also, a high pressure to overcome the high inertia of the whole pantograph in following small changes in trolley height is not required.

Wear on the trolley with the lower pantograph pressure is negligible and trolley renewals are infrequent. Larger variations in trolley height are taken care of, as usual, with the main

body of the pantograph, in which movement is made freer by use of roller bearings and lighter weight.

Operators in Switzerland have succeeded in collecting 180 amp. at 55 m.p.h. with one aluminum shoe and without sparking. At 27 m.p.h. they have collected 250 amp. The contact pressures vary between 6 and 9 lb. Tests have shown that using two pantographs not only insures sparkless collection but also that the life of the shoes is nearly doubled. With a single shoe the life is about 3,100 miles and with a double shoe 5,600 miles on an average. This indicates that the reduced current density and sparking decrease the wear on the shoe and the contact wire as well. In Switzerland the wear on the trolley wire has been found to be negligible. This experience seems to be typical of all the other systems of this type in Germany, Austria and Sweden.

The main advantage in the use of lighter pantograph pressure is not that of decreasing wear on the contact line and shoe, but the reduction in weight of the entire overhead system. Because the distribution system may cost

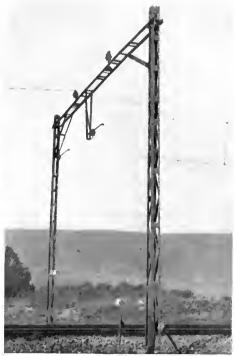


At left, high-pressure pantographs of this type are in use in America. At right, a typical European high-voltage pantograph with low pressure on the trolley. Note the bow supporting the contact shoe

from 25 per cent to 35 per cent of the total cost of the electrification, the reduction effected by using lighter overhead is substantial. Designers of the high-pressure pantograph system are tending to make the catenary heavier with the addition of intermediate trolley wires, demanding larger supporting stretches. Additional wires may be needed for a direct-current overhead system, but not for a normal high-voltage alternating-current system. Designers of the low-pressure pantograph system are abandoning the complex forms of catenary and adopting simple, flexible suspension with a messenger and a single contact wire. Operators in Germany, Austria and Switzerland have tried an intermediate trolley wire to give flexibility and have decided that it is unnecessary with their type of collecting apparatus. In Sweden also the simpler types of catenary are used. Detailed characteristics of the design described are shown in the accompanying table.

Other characteristics of the lighter catenary design are of interest. All contact wires are given a zigzag





At left, standard catenary construction on an Austrian main line. The steel I-beam supports are set in concrete. At right, simplicity and sturdiness characterize this Swiss overhead

DETAILS (OF CATE	NARY DESIGN FO	R NORMAL	HIGH-VOLTAGE	ALTERNATING-C	URRENT I	DISTRIBUTION SYSTEM	M Pantograph
Name of Railroad	Voltage	Messenger	Auxiliary	Contact Line	Tangent Hangers	Spans, Ft.	Loading	Preseure
Swiss Federal	15,000	50 sq.mm. in. galv. steel		107 sq.mm. 0000 copper 1,100 lb. tension	4 mm. 5/32 in. copper and ateel apacing 32 ft.	200 and 330	14 lb. wind per sq.ft. 5.3 lb. ice per ft. catenary	6 to 7 lb.
German State	15,000	50 sq.mm. in. galv. steel, copper clad steel or bronze		100 sq.mm. 0000 copper	10 sq.mm. 3/16 in. bronze strand apacing 35 ft.	250 and 480	69 m.p.h. wind 0.81 lh. ice per ft. catenary	7 to 9 lb.
Austrian Federated	15,000	65 aq.mm. 7/16 in. 1,320 lb. tension galvanized steel	• • • • • • • • • • • • • • • • • • • •	100 sq.mm. 0000 copper 1,320 lb. tension		200	•••••	7 lb.
Swedish State	16,000	50 sq.mm. in. 880 lb. tension copper	•••••	80 sq.mm. 000 copper 1,320 lb. tension	Spacing 32 ft.	200	•••••	7 lb.
New York, New Haven & Hartford and New York, Weatchester & Boston.	11,000	9/16 in. galvanized stee	0000 Copper 1,000 lb. tension	0000 phone 3,000 lh. tension	k steel rod apacing 15 ft.	250	71 m.p.h. wind 8 lb. wind per sq.ft. 1 in. sleet 2 lb. ice per ft. catenary	14 to 20 lb.
New York Connecting	11,000	in. extra high strength phono	0000 copper	0000 phono	in. phone rod spacing 30 ft.	300	Same	14 to 20 lb

alignment from pole to pole instead of being in a straight line, to distribute the wear on the pantograph. This requires a steady brace at each pole. Since these are also necessary for wind bracing in tangent sections no additional expense is involved. The effect of wind forces has been considered more by European operators and it is the determining factor in the spacing of poles for horizontal support in tangent sections. For instance, the Germans in determining the general standards for catenary construction on all their lines determined the maximum distance between supports to be about 250 ft. for a wind velocity of 69 m.p.h. and an allowable variation of $2\frac{1}{4}$ ft. from the center line of the track. In curved sections the tangent construction is continued as a series of chords within the limits of the alignment used for the zigzag arrangement, which varies from 17 to 24 in. In both Switzerland and Germany some longer spans of 330 ft. and 480 ft. are in use with intermediate horizontal bracing poles.

Pico Street Viaduct Dedicated

DEDICATED with fitting ceremonies last month, the new 1,007-ft. Pico Street viaduct in Los Angeles, Cal., erected at a cost of \$306,000, embodies the latest engineering developments and does away with a hazardous grade crossing. The event, sponsored by the city, the county and the Pacific Electric Railway, was presided over by Vice-President and General Manager D. W. Pontius. Brief addresses were made by Mayor Cryer, County Supervisor Graves and David R. Faries, chairman Los Angeles County grade crossing committee. Mr. Pontius introduced the speakers, gave a brief history of the project and cited facts and figures in connection with the structure.

The Mayor called attention to the speed of erection, the massive girders and concrete piers having been placed so expeditiously that traffic on Pico Boulevard was delayed less than eight hours. The Mayor, Messrs. McClellan and Faries then participated in the ceremony of driving three golden spikes at the point where the final work marking the official completion of the struc-

ture was staged, after which the large number of persons who had witnessed the exercises were conducted on a tour of inspection under the structure. To demonstrate the lack of noise and absence of rumbling, a train traveling at high speed was operated over the viaduct with the visitors immediately below the structure. It was generally conceded that less noise developed than that which arises from a train passing over the surface streets.

The Pico Street project just completed is the outgrowth of the activities of the Los Angeles County grade crossing committee, organized in 1923 to make a comprehensive study of the problem in southern California. The committee is composed of city, county, state and railway representatives. The Pico crossing was found to need relief most quickly, owing to the tremendous amount of vehicular traffic and a daily average of 123 trains of the Pacific Electric Railway across Pico Street.

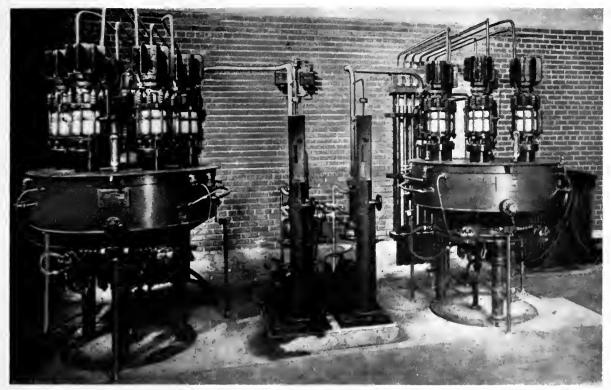
Originally intended to separate traffic only at Pico Street, the plans were broadened so as to extend the structure over both Tremaine and Longwood Avenues. Involving an expenditure of \$306,000, the Pico Street structure is 1,007 ft. in length, being the longest by several hundred feet of any of the 65 grade separations now located on the lines of the Pacific Electric. The section over Pico Street, 291 ft. in length, is of steel construction, so designed as to utilize the minimum amount of road space. The approach on either side is of reinforced concrete, the entire unit being supported by concrete piers spaced at 32-ft. intervals.

The noise reduction has been accomplished largely by the use of mass concrete construction for the trough decks supporting the railway tracks. This feature permits standard rock ballast over the entire length of the viaduct. The massiveness and large number of supporting piers also contribute to elimination of noise and rumbling.

The expense of this project up to the north side of Pico Street was borne jointly by the Pacific Electric Railway and the city, while beyond this point the cost was shared one-third each by the railway, city and county. Work was started on May 27 last and was completed within six months.



The new Pico Street viaduct in Los Angeles eliminates a hazardous grade crossing



Installation of the 1,000-kw. mercury-arc rectifier set consisting of two six-anode, 600-volt tanks

Rectifier Superior to Converters

on North Shore Line

Operating results of mercury-arc rectifier show higher efficiency, simpler operation, less maintenance cost and other advantages. Five months actual figures indicate that reliability in service has been attained

By Caesar Antoniono

Electrical Engineer Chicago, North Shore & Milwaukee Railroad

Mercury-arc rectifiers in America have been perfected along lines similar to those followed in Europe. The present article, which is abstracted from a paper presented at the regional meeting of the Great Lakes Section, American Institute of Electrical Engineers, held at Chicago, Ill., Nov. 28-30, 1927, is of particular interest as giving details of operating results with rectifiers over an extended period.—Editor.

EVELOPMENT of the mercury-arc rectifier in this country in commercial form is very much in its infancy. It appears to be used more extensively in Europe, and the extent to which it will be applied here is limited only by the economical and operating results which can be obtained.

In considering its adoption to any property we naturally compare it with the synchronous converter and motor-generator set designed to serve the same class of

service, with which we are familiar. The advantages of the mercury-arc rectifier over the synchronous converter and motor-generator, according to previous articles, are: (1) High efficiency over the whole working range; (2) very high capacity to absorb momentary loads; (3) insensibility to short circuits; (4) no synchronizing; (5) simple operation and minimum attention; (6) noiseless operation and no vibration; (7) low maintenance cost; (8) reliability of service.

This article discusses each of these points in connection with the experience we have had with the operation of a rectifier on the Chicago, North Shore & Milwaukee Railroad. The rectifier is rated at 1,000 kw., 600 volts direct current and is located on the section of the road as shown in an accompanying diagram. This section is fed also by synchronous converters of 1,000-kw. and 1,500-kw. rating, as shown. The rectifier, made by the

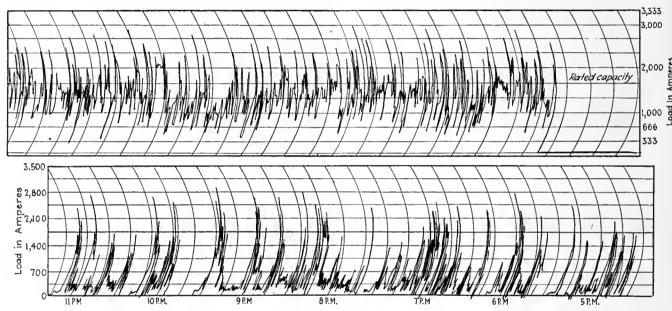
General Electric Company, is said to be the first 600-volt machine made in this country which has been installed in actual service.

The efficiency of the rectifier was compared with that of five converter installations by taking measurements on each substation for five months. The results are shown in Table I. The efficiency is taken as the d.c. output divided by the a.c. input. The figures include the efficiency of power transformers and converter or rectifier. They do not include the power used for the operation of automatic devices in auxiliaries such as vacuum pump, motor-generator set, heaters in the rectifier station, nor the power used by auxiliaries and a.c. contactors in the converter stations. I believe this comparison is fair. Although not exactly correct, it shows a pronounced difference in the efficiencies of the two types

A load of this kind would be without thermostatic control and might last indefinitely. It could be caused by traffic schedule disarrangement on account of trouble, extra passenger or freight service or a trolley wire on the ground at such a distance that the resistance of the feeders would limit the current.

Happenings of this nature are not unusual on a railroad, and I believe that we have more than one time imposed on the rectifier an overload of much longer duration than we know. There are no recording instruments to show when this occurs. The rectifier does not show any signs of having been abused; momentary opening of the high-speed circuit breakers is the only indication that there must have been excessive load.

Our experience shows that the rectifier is not sensitive to short circuits. Repeated reclosing on a short circuit



Above—Current delivered by mercury-arc rectifier on day of extremely heavy load Below—Another graphic ammeter chart showing typical load on the rectifier substation

of equipment under nearly similar load conditions and very low load factor. .

The ability of the rectifier to carry high momentary overloads is seen from the graphic ammeter chart showing current delivered on a day of extremely heavy load. The chart was taken twelve hours after the unit was put in operation. It shows load peaks much above the rating of the rectifier. There were no signs of its being overloaded, and an occasional opening of the high-speed circuit breaker, which would reclose immediately, was the only trouble experienced in carrying this load. The other graphic ammeter chart shows a typical load on the station. There are many very high load demands of short duration, some of them well above the rated capacity of the rectifier.

On sustained overloads we are not in position to give much information. Usually the load demand above the rectifier rating is of short duration, but there are unusual conditions on the railroad when a load of 175 or 185 per cent of the substation capacity may be carried by any of these stations. The duration of this load is controlled by thermostats on the load-limiting resistors set to release this load in about six or seven minutes.

It is, however, possible to have a load above the rating of the equipment and below the 175 per cent overload relay, setting for a much longer time than seven minutes.

does not affect the rectifier. Under the same treatment a synchronous converter of the same capacity would be likely to flash over regardless of the protective devices, and in an automatic substation it would lock itself up and the station would be shut down until an inspector could put it back in service.

OPERATION IS SIMPLE; No SYNCHRONIZING NECESSARY

The fact that synchronizing is not necessary with the rectifier is quite important. In the automatic substations on our system only four to six seconds is required to connect a rectifier to the line. From 20 to 35 seconds is required to put a converter on the line. Therefore, we can deliver a higher voltage to the train and trolley 16 to 29 seconds sooner with a rectifier.

We must agree that the mercury-arc rectifier requires less attention than the synchronous converter and its operation is much simpler. There are no brushes, commutator and slip rings to take care of. There is no dust spreading over the equipment. This advantage is very much appreciated in automatic stations without attendants. The ventilation of the equipment and buildings is also simplified as compared with converters, especially in unattended stations.

I do not want to create the impression that there are

less devices involved in the mercury-arc rectifier than there are in the converter station. On the contrary, with the rectifier more auxiliaries are used, such as arc-starting exciters, vacuum pump, water supply, temperature regulators, tank heaters, etc. While with us some of these devices have caused a large number of shutdowns, the troubles were in the individual pieces of apparatus and they have been corrected. Those devices should not require much attention.

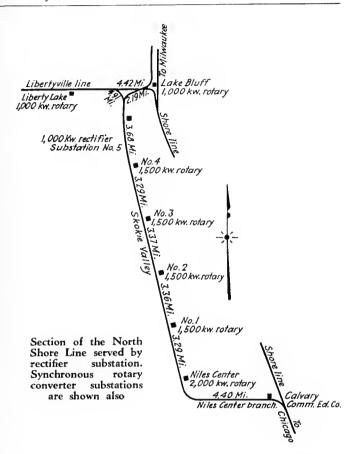
The absence of vibration and noise in the mercury-arc equipment makes it possible to install it in locations where the synchronous converter would not be allowed. one converter installation it cost about \$8,000 for soundproofing and ventilating the substation building, eliminating the noise to comply with the wishes of the surrounding residents. Such expense would not have been necessary with mercury-arc equipment. Incidentally, in addition to the first cost we have added ventilating equipment and extra building maintenance. Obviously with the absence of vibration it is not necessary to install special foundations for the rectifier; it may be set on an ordinary floor. Ventilation becomes of minor or no importance, and in general a less expensive building is required.

RELIABILITY AND LOWER MAINTENANCE COSTS IMPORTANT CONSIDERATIONS

We do not know at this time just what maintenance will be necessary on the rectifier. From May, 1926, to May, 1927, this station was attended by an operator and the manufacturers of the rectifiers kept a close watch on its performance. Being in a development or trial stage, they took care of necessary maintenance. In addition, new developments which they made in other installations were applicable to this equipment and minor changes were made accordingly. Since May of this year this equipment has been in automatic operation without an operator. The maintenance required is very little; outside of the regular weekly inspections it has amounted only to supplying a little oil. Like others, we are watching this item with a great deal of interest. Our impression is that the maintenance will be very much less than that required for a converter.

The automatic rectifier station is as reliable as the average 60-cycle synchronous converter station of the same capacity, if not more so.

The record for this rectifier substation commencing with May, 1926, when it was first put in service, all through a trial and adjusting stage until May, 1927, when

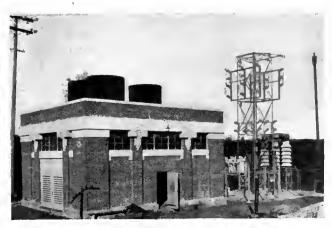


it was made automatic, is given in Table II. Commenting on the data in this table it is of interest to note that the time the rectifier was out of service on account of trouble with the rectifier itself was 0.435 per cent of the total time. The time lost on account of the auxiliary failures was 0.674 per cent of the total time.

The nature of the trouble with the auxiliaries is rather interesting. It would be expected to have a larger amount of trouble with the rectifier on account of its newness in the field, but to have a small motor-generator set or a chain on a water pump and motor cause this bad record is out of place in our days. Engineers have been building and operating motor-generator sets and water pumps for years, but in this case we were after the big things and let the little things cause the most trouble. Fundamentally the record is good; the nature of the troubles is not serious. The record as an automatic substation, since May, 1927, is given in Table III.



The rectifier and complete automatic switchboard, including highspeed circuit breakers in positive and negative machine circuits and feeders



Exterior of the North Shore rectifier substation showing 33,000-volt incoming lines, oil circuit breakers, outdoor type transformer and oxide film arrester

TABLE 1—PERFORMANCE OF RECTIFIER AND SYNCHRONOUS CONVERTER SUBSTATIONS

The kilowatt and efficiency values do not include the power used for the operation of automatic devices in auxiliaries such as vacuum pump, water pump, motorgenerator set and heaters in the rectifier station nor the power used for auxiliaries and alternating-current contactors in the converter stations

Substation	No. 1	No. 2	No. 3	No. 4	Liberty	No. 5
Type Machine	Con- verter	Con- verter	Con- verter	Con-	Lake Converter	Ractifier
Rating, Kilowatts	1,500	1,500	1,500	1,500	1,000	1,000
May 1927						
Total alternating current	87,300	43,500	69,600	125,700	115,950	89,700
input, kilowatt-hours Total direct current out-						
put, kilowatt-hours Total hours run	62,130 341	30,550 201	53,200 310	97,900 434	83,154 496	71,952 403
Average hours per day Average kilowatt-hours	11	6.5	10	14	16	13
per hour	182	151	171	225	167	178
Efficiency, per cent	71.2	70.2	76.5	7 8	71.8	80
June 1927 Total alternating current						
input, kilowatt-hours	86,800	34,200	74,400	84,300	139,950	75,900
Total direct current out- put, kilowatt-hours	59,024	23,214	58,200	62,400	105,844	62,857
Total hours run	300 10	180 6	330 11	315 10.5	660 22	270 9
Average kilowatt-hours per	130	128	176	197	160	232
Efficiency, per cent	68	67.8	78.3	74	75.6	82.8
July 1927						
Total alternatiog current input, kilowatt-hours	82,200	34,200	78,300	95,700	146,100	79,950
Total direct current out-					·	· ·
put, kilowatt-hours Total hours run	57,140 341	25,294 201	60,800 341	73,000 3 7 2	104,263 715	65,747 387.5
Average hours per day Average kilowatt-hours per	11	6.5	11	12	23	12,5
hour Efficiency, per cent	167 69.5	125 73.7	178 77. 6	196 76.3	131 71.3	170 82, 2
	07.7	15.1	77.0	70.5	71.5	02.2
August 1927 Total alternating current						
input, kilowatt-hours Total direct current out-	95, 70 0	32,100	104,400	84,600	119,250	70,215
put, kilowatt-hours	69,770 403	21,133 186	83,200 372	65,800 310	88,246 434	56,721 341
Total hours run	13	6	12	10	14	241
Average kilowatt-hours per bour	173	113	223	212	203	166
Efficiency, per cent	72.9	65.8	7 9. 7	77.8	73.1	80.7
September 1927 Total alternating current						
input, kilowatt-hours	84,300	50,220	95,370	83,040	118,740	83,460
Total direct current, output, kilowatt-hours	61,190	33,197	75,300	62,300	88,731	67,868
Total hours run	330 11	240 8	360 12	285 9.5	525 17.5	420 14
Average kilowatt-hours per						
Efficiency, per cent	185 72.6	138 66.1	209 78.9	218 7 5.0	169 74.7	161 81.3
Average efficiency of each						
substation, per cent Average kilowatt-hours per	70.8	68.7	78.2	76.3	73.3	81.7
hour	167.4	131	191.5	209.2	166	181.4
per cent			73.4			81.7

Of all these shut-downs, the five lock-outs after the third closure of the oil switch could be questioned and possibly may have been caused by arc-back in the rectifier, or by other troubles in the control which we have not detected. None of the remaining troubles were inherent with the rectifier, but were caused by auxiliary devices.

Our confidence in its reliability is such that we have established a weekly inspection for this rectifier station, but we do not consider it advisable at present to leave a converter so long without inspection.

RECTIFIER COMPARED WITH SYNCHRONOUS CONVERTER OF SAME CAPACITY

The record of the rectifier was compared with that of a synchronous converter of modern design and of the same capacity. This converter is located on another section of the railroad where the load conditions are about the same. It is protected from excessive loads by load-limiting resistors without high-speed circuit breakers. In this comparison I did not use any of the converters shown in the accompanying illustration, because these converters are of larger capacity than the rectifier and naturally they are more stable and would take a larger shock and carry more load without flashing over. Neither have I used the converter at Liberty Lake, as the mo-

MAY, 1926, TO MAY, 1927		Total Time
f Shut-down	No.	Minutes
ature of tanks. ble. n and motor on water pump. ction and bad control circuit. np trouble, motor and oil pump anodes. des sticking. s unknown	39 13 3 6	48 536 315 50 260 819 602 1,109
ut-downs	83	3,739
ectifier operated 337,140 minutes.		
No. of Time	of Time	Per cent of Time of Operation
	58 39	0.435 0.674 1.109

mentary load demands on this station are less than they are on the rectifier.

The converter which I compared had 45,434 hours of run on its record on May, 1927, and had 34 flashovers causing as many shut-downs, representing 276 hours out of service on account of flashovers. There was an average of 8.1 hours out of service per shut-down, as the majority of these flashovers damaged commutator flash barriers, brushes, brush rigging and the insulation in other parts of the machine.

Since May, 1927, to date, this same converter flashed over eight times, and due to the many flashovers which this machine has had extensive repairs had to be made on the commutator, rings and other insulation involving 150 hours in one shut-down. This record seems to indicate that the troubles with the rectifier itself probably will not be as serious as with the converter of the same capacity under similar load conditions.

The writer has great confidence that the mercury-arc rectifier is here to stay and predicts in ten or fifteen

TABLE III—RECORD OF FAILURES SINCE MAY, 1927, WHEN SUBSTATION WAS MADE AUTOMATIC

SUBSTATION WAS MADE AUTOMATIC	
T. II	No. of
Failure in auxiliary	Shut-downs
Motor on one vacuum-pump burned out	1
definite time during storms	3 İ
latch	. 3
definite time, cause unknown	. 5
tion of devices	1
Total shut-downs	. 13

years from now a large application supplementing the converter. The converter had its days, the rectifier's days are coming. It is true that the rectifier at present costs more than a converter of the same capacity and there is some misunderstanding as to its rating. But with an increasing number of installations and our co-operation as operators with the manufacturers the development process will be speeded up and the production cost will naturally be reduced to a figure comparable with that of the converter.

Birmingham Believes in Advertising Its Service

Coffin brief of Alabama company shows that it uses a great variety of means for bringing the merits of car riding to the attention of its public

TTENSIVE advertising of its railway and electric light and power service is believed in by the Birmingham Electric Company, Birmingham, Ala., as a paying proposition. It uses all the recognized mediums, such as newspapers, billboards, car cards and the backs of its electric light bills. A typical message appearing on a lightbill one month was as follows:

"Let the street cars pay your gas and electric bills. By using the street car instead of your automobile in going to and from town every day you will save enough each month to more than pay your gas and electric bills."

In using the inside of its cars the company not only "takes its own medicine," but says in its brief for the 1927 Coffin Prize: "In our opinion, this is the most effective advertising that our company has used."

The inside car advertising is not in the usual position of a car card, but in signs 8x30 in., fitting into metal frames, which are fastened in the deck windows, so the signs can be seen from both the inside and the outside. There are seven of these signs on each side of the car. Viewed from the outside, each window contains one word, or perhaps two short words, the seven signs forming a sentence. On the reverse side of each of these cards is other wording which is visible to passengers inside the car.

These inside signs are illustrated in colors and each contains a separate sentence or statement, usually information about the street railway service, or what might be termed good-will copy. These signs are printed in smaller type than those on the outside because they are read at a comparatively short distance by passengers in the car, whereas the outside signs may be read 40 or more feet away.

These window signs are changed once a month. Some of the copy used for the outside lettering follows: "Use the street car, safe, economical, dependable." "Use the street car, avoid accident liability." "Street cars are the best means of going to and from town."

The following have been used on the inside of cars. "One of the ways to relieve traffic congestion is to use the street car." "A good street car railway system is essential to a city's progress." "One hundred extra cars are used to carry the rush-hour crowd every afternoon." "If you have any commendation or criticism for our service, write to us about it."

These cards are painted by colored stencil process and the reverse side is printed on a press. They are relatively inexpensive when used in large quantities.

DASH POSTERS ALSO CARRIED

In addition, dash posters of heavy cardboard are carried on both ends of the car and are changed weekly. Approximately 90 per cent of these spaces are used for

posters carrying messages and slogans similar to those used on billboards and other advertising of the company. The other 10 per cent is used for carrying posters for local organizations, advertising amateur performances, religious and educational meetings, etc. This space is also used for advertising baseball and football games, circuses, theaters, etc., all of which help to increase street car traffic. On occasions when large conventions are being held in the city special dash posters are used,



Attractive window signs in colors amuse the car riders and teach a lesson

reading, "Welcome, Visitors! Let us serve you!" or some similar message.

Other wording that has been used is: We try to avoid accidents, do you?" "Let us solve your parking problem."

Views are published of typical attractive window signs, a typical dash sign and a drawing showing the method of making the frames for the signs.

Moving Pictures Found Effective

Moving pictures have also been used very advantageously in the publicity program. A short movie reel was made entitled "Mrs. Birmingham Goes Shopping." The rôles were taken by members of the transportation department and the narrative of the scenario included a satire on the difficulties of finding a parking place and getting through congested traffic. The reel was run for a week in a leading downtown theater and then made a tour of the suburban theaters. As the picture contained several excellent comedy situations and



Dash signs are changed once a week and are held in a frame for their protection

made no direct mention of the company, the theaters showed it free of charge.

A series of ten short films, or trailers, have also been used during the year. Several of these dealt with the parking problem; others suggested using the street cars for going home to noonday lunch, while still others depicted the various operations incident to maintenance, such as car washers in operation.

Display advertising has been used each week in each of the three daily newspapers. After trying several different sizes and styles of ads, the company decided to use one large advertisement each week in each of the three papers, rather than running a small advertisement more frequently. These advertisements are as a rule approximately a quarter of a page and are such that they will dominate the page and will force their attention upon the reader.

All copy for newspaper advertisements is prepared by members of the company's staff, but a commercial artist is employed from time to time to prepare illustrations. The cuts are usually such that they can be used a number of times by changing the copy. An old cut run with new copy, after an interval of a month or more since its last publication, is considered as effective as an entirely new illustration. All newspaper copy has been limited to short statements about the service and is designed to tie in with the other mediums of advertising which are used.

One subject about which much of the advertising in newspapers has been built is that "the street car is the most convenient and satisfactory means of going to and from the crowded business area."

In addition to the advertising in the daily papers, four ads are carried in practically every weekly paper published in the country, including two negro papers and two papers published in Italian. Programs and papers published by schools and churches and fraternal and labor organizations are patronized to a limited extent.

DIRECT SOLICITATION

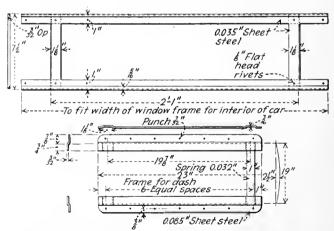
Occasionally direct solicitation for business has been undertaken. One case was in a district which formerly had been served by a shuttle line, but where it was decided to install through service. The neighborhood concerned was a fashionable one where many of the residents had more than one automobile per family, but the line never had enough revenue even to pay operating expenses.

The week before the new through service was put in effect five trainmen were selected to make a house-to-house canvass of the territory served by the line. They were coached to deliver a short talk concerning the through service and the new schedule. Small cards announcing the plan and containing the detailed schedule on the back were printed for distribution. The various canvassers, under the supervision of the efficient chief inspector, called at every house in the territory served, explained the new service and left one of the cards containing the schedule. Schedule cards were also placed in the various drug stores in the distirct and distributed by the car crews during the week prior to the opening of the new line.

When the new service was inaugurated a noticeable increase in traffic was felt, and motor car owners who never patronized the line before became regular patrons. The results were so satisfactory that a similar canvas and distribution were made when another line began through service several months later.

That the company's broad program of selling its service has been successful is shown by the steady increase in patronage which has resulted. The total number of passengers transported during the past three years is as follows:

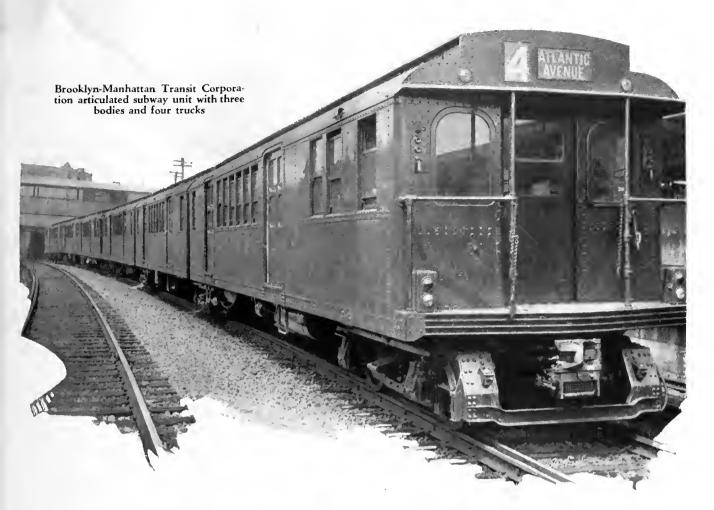




These are working drawings of the frames used for dash and interior signs at Birmingham, Ala.

Earnings for the first four months of 1927 exceeded the earnings during the same period last year by \$5,562.49.

This increase is doubly remarkable because it was obtained during a period in which the number of automobiles per inhabitant was increasing at an unprecedentedly rapid rate.



Articulated Cars

Meet Unusual Requirements

This type of car is suitable for heavy loads on subway and surface lines, but is not flexible where small units are needed at certain periods

By W. J. Clardy

General Engineer Westinghouse Electric & Manufacturing Company

ONSIDERABLE study has been given the articulated car, both in the United States and in foreign countries. Permanently coupled cars, which are closely allied with articulated units, have also received some attention. Both types appear to have advantages for meeting certain unusual requirements, but their field is more or less limited.

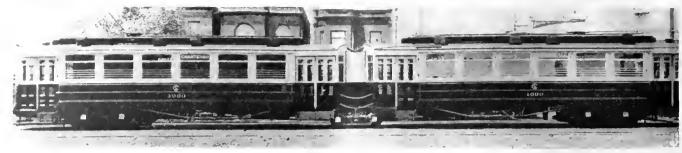
Of the important articulated cars illustrated, the most popular consists of two bodies mounted on three trucks. Longer units are practicable from a construction standpoint, as that of the Great Northern Railway of England, which is made up of five car bodies on six trucks.

The permanently coupled units consist of two complete cars connected in a manner which precludes their separation while in normal service. Such units can be split up easily when they are shopped and little special

construction is involved. Not more than two car bodies have been joined in a unit.

The field for articulated and permanently coupled cars is restricted because such units are much less flexible than single cars. The most extensive use of articulated units has been in subway service where relatively long trains are required, even during non-rush hours. One principal advantage is the practical elimination of nosing. This results in better riding qualities and a material reduction in track maintenance. Permanently coupled cars are also used in subway service, but the advantages are not as great with respect to track maintenance and riding qualities as for articulated cars.

Surface operation of articulated and permanently coupled units is likewise restricted. Two-car units are frequently useful in rush hours, but traffic rarely demands



Chicago Surface Lines articulated city car

more than single cars for the non-rush. Investment in equipment that can only be economically used during heavy traffic periods is difficult to justify. Where traffic demands two or more cars in trains in all-day service, the articulated car can be used. In fact, it offers an excellent opportunity to secure lower operating costs by reducing expenditures for maintenance, power and platform labor. A recent adoption by a high-speed, heavy-traffic interurban illustrates the utility of articulated cars.

BROOKLYN SUBWAY CARS HAVE THREE BODIES

Articulated cars are being generally used by the Brooklyn-Manhattan Transit Corporation in subway service. In 1925 four trial articulated cars were introduced. Their success led to the purchase of 67 additional units in 1926 and 50 more in 1927.

These articulated cars consist of three car bodies mounted on four trucks with 200-hp. motors on the front and rear trucks in the first four triplex cars. In the later cars one motor is placed on each truck. The electrical apparatus really comprises two complete subway equipments with a total of four motors and two sets of control per unit. The complete weight of one articulated unit is 106 tons.

Articulated car subway operation in Brooklyn demonstrated several operating advantages as follows: (1) Reduced track maintenance incident to elimination of

nosing; (2) improved riding qualities; (3) less train friction, resulting in energy economy; (4) passage between car bodies of a unit giving better distribution of load.

The units are suitable for both express and local service. A non-rush-hour train consists of two triplex cars, while three are used during the rush. Variations in headways, together with the relatively large capacity that must be provided even in non-rush-hour trains, make the triplex car sufficiently flexible to meet Brooklyn subway requirements.

An articulated unit known as a "duplex car," placed in service on the Brooklyn surface lines in 1924, was constructed from old equipment. It consists of two car bodies mounted on three trucks. This is entirely experimental and no further use has been made of equipment of this type on surface lines in Brooklyn.

Boston Elevated Railway Uses Permanently Coupled Cars

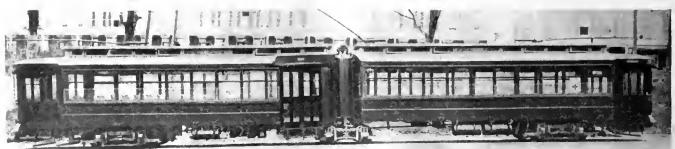
The Boston Elevated Railway operates a number of permanently coupled cars in subway service and has experimented with articulated cars on surface lines. A definite program for the retirement of old equipment is in effect and developments that promise more economical operation are carefully investigated.

The permanently coupled cars are used in the East

SOME ARTICULATED OR PERMANENTLY COUPLED TRAIN UNITS

User	No. of Bodies	Service	Over- all Length, Ft. In.	Weight, Lb.	Seats	Wt. per Seat, Lb.	Motors	Wheel Di- ameter In	Con- trol	Single or Donble End	Collector	New or Rebuilt from Old Cars	Date in Serv- ice
Artienlated Boston Elevated Railway Brooklyo-Manhattan Transit Corporation. Milwankee Electric Railway & Light Co. Detroit Municipal Railway. New York Rapid Transit Corporation Great Northern Railway of Eogland Great Northern Railway of England United Railways & Electric Company Washington, Baltimore & Annapolis Electric Railroad. Chicago Surface Liocs	3 2 5 2	Surface Surface Surface Surface Subway Suburbau Main line Surface Interurbau Surface	61— 9½ 63—10 89— 2½ 122— 8 136— 9 102— 0 246— 1 74— 8 99— 8½ 89— 2	72,000 75,000 75,000 212,000 100,000 264,700 66,070	104 71 102 140 160 128 128 87	750 1013 735 536 1072 781 2068 760	4— 30 4— 40 4— 65 4— 60 4—180 4— 65 4— 65 4— 50		eam ra	ilroad ser ilroad ser		Rebuilt Rebuilt Rebuilt New New Rebuilt	1912 1924 1920 1924 1926 1927 1926
Permanently Coupled Boston Elevated Railway Twin City Rapid Transit Company		Subway Surface	94— 6 94— 0	88,800 53,000	88 104	1009 510	8— 40 8— 25	26 26	M. U. K-43	Double Single	Third rail Trolley	New New	1923 1922

^{*}Both overhead trolley and underground conduit.



United Railways & Electric Company of Baltimore articulated city car



Boston Elevated Railway permanently coupled subway cars

Boston Tunnel. On account of clearance limitations it was necessary to build small, light-weight, double-truck subway cars. There are 40 of these, weighing 44,000 lb. complete with all equipment excluding load. They are equipped with four 40-hp. motors mounted on 26-in. wheels. There are three sliding doors on each side of the cars and end doors which permit passage between cars. The equipment is arranged for operation in units of two cars permanently connected. It is possible to separate the cars of a unit, but it is necessary to do it in the shop. Trains are made up of one or more two-car The new equipment has proved very satisfactory in this service. Permanently coupled cars do not have all of the advantages of articulated units with respect to "nosing," but the riding qualities are good and operation here is efficient.

The articulated units experimented with on surface lines were constructed from two old single-truck cars. Operation was not particularly successful and no service is maintained at present with this type of equipment.

W., B. & A. Runs Articulated Cars in Interurban Service

The Washington, Baltimore & Annapolis Electric Railroad placed ten articulated cars in service last spring. Each unit consists of two car bodies mounted on three trucks, both the front and rear trucks being equipped with two 125-hp. motors. The total weight of a complete unit is 58 tons.

The cars are used in half-hour limited service on the main line between Washington and Baltimore. The distance is 40 miles and the running time 85 minutes, a schedule speed in excess of 28 m.p.h. Normally one articulated car is run, but electro-pneumatic unit switch train control is provided, as two units are required to handle heavy travel. Comfortable, spring-cushioned, mohair-upholstered seats arranged to revolve in pairs are a feature of the cars. Savings in maintenance, power and platform labor promise an attractive return on the investment in the equipment.

The Milwaukee Electric Railway and Light Company has used on the surface lines for several years articulated units consisting of two car bodies mounted on three trucks. These were constructed in the railway company's shops from old equipment. The vestibules were removed from one end of each car and the cars joined together through a swivel link, supported on a new truck. The complete weight is 75,000 lb. There are four 65-hp. motors, two on the front truck and two on the rear truck. Drum control is used, since there is no necessity for operating more than one unit.

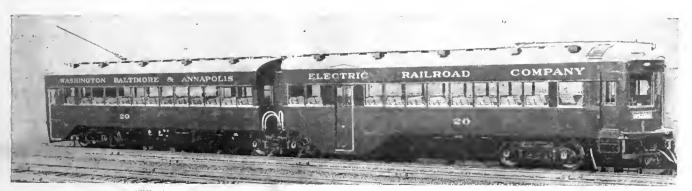
These three-truck articulated cars were built primarily for rush-hour, heavy-load trips. The units are economical during periods of heavy travel, since only two platform men are required. The conductor is located in the vestibule between the car bodies. Operation is center-entrance, pay-as-you-enter, front or center exit. They have proved satisfactory after several years service.

United Railways & Electric Company Has Both Types

The United Railways & Electric Company of Baltimore is making extensive use both of articulated and permanently coupled cars. Experience has indicated that the articulated cars are the most satisfactory. All units now being built and planned for the future are articulated. There are 28 of the articulated cars in Baltimore. They weigh 66,000 lb. complete. Each unit consists of two car bodies mounted on three trucks with two 65-hp. motors on each end truck. Double-end electro-pneumatic unit switch control is used. Two old cars are rebuilt to form each articulated car, but new electrical equipment is applied.

The articulated cars are operated front-entrance center-exit with only two platform men. Normal running is single end and the controller at the rear is used only in emergency. The cars were constructed primarily for rush-hour service. While used mostly during the heavy traffic periods, they sometimes are run throughout the day. The articulated units have proved successful in Baltimore and some attractive operating economies are being realized.

The Department of Street Railways of the City of Detroit purchased a special four-truck, three-car body



Washington, Baltimore & Annapolis Electric Railroad articulated interurban car



The Milwaukee Electric Railway & Light Company articulated city car

articulated car some time ago for trial in heavy city service. The unit has four 60-hp. motors, two on each of the end trucks, with drum control for single-end operation. The complete weight is 75,000 lb.

No additional articulated cars have been purchased for Detroit, though their use on heavy traffic lines has been contemplated. A few routes require two-car trains in all-day service and offer opportunity for economical service with articulated units. The Woodward Avenue line has such heavy traffic that it is difficult to provide sufficient service with two-car trains. Three-car trains could be used to advantage and possibly the articulated triplex unit would offer a means of effecting an economy.

CHICAGO SURFACE LINES TRIES ARTICULATED UNIT

The Chicago Surface Lines built an articulated unit consisting of two car bodies mounted on three trucks. It was constructed from old cars early in 1927 and has been in service since that time. It is equipped with four 50-hp. motors, two on each end truck, and double-end drum control. The complete weight is 72,000 lb. and seats are provided for 91 passengers.

It is not planned to construct and operate additional articulated cars in Chicago. The performance of the present unit has indicated that economies are not sufficient under existing operating conditions to justify extensive use of rolling stock of this type.

Readers' Forum

The Off-Peak Load Can Be Built Up

Mount Vernon, N. Y., Jan. 4, 1928.

To the Editor:

Henry W. Blake's article in the Dec. 10 issue on "Fares and Fare Collection in Europe" and his Dec. 24 article on "Answering Questions Before They Are Asked" should be read and reread by every American operator interested in the sale of the ride.

The last two or three years have seen a thorough overturn of ideas on car appearance and upholstery. That is all to the good. Yet it is not enough to provide better goods; we must also know how to price them and how to suggest objectives for riding. It is astonishing how the same management which spends hundreds of thousands of dollars for new cars will hesitate to plunge for a fraction of that amount in trying to sell rides.

We have been hearing much lately about increased rush-hour business going hand in hand with decreased off-peak business. Should this condition be taken for granted? What claim can we lay to salesmanship and sales effort if we are going to assume that all our patronage is compulsory?

European roads offer helpful suggestions here. You do not have to follow their copper zones, but you can have 5-cent short-haul fares rather than no fares at all. Look over the variety of fares in London alone, and ask yourselves if you have no opportunity to do something with lower rates in the shopping hours. Why the slogan of "Shop more from 10 to 4" unless you put some inducement back of it? Don't let the bugaboo of non-registered fare prevent you from trying plans that make the ride more agreeable through elimination of change-making and transfers. Bear in mind that the healthiest group of electric railways in America—those of Canada—manage to get along with half our fare—checking labor. Don't let the accounting tail wag the transportation dog where more revenue from more riders is concerned.

To return to the lament about loss of off-peak traffic, it is a loss to be expected on a flat-fare system because the off-peak rider is not under the same urge to use the trolley service. But it is not unavoidable. More off-peak and short-haul fares supply the natural answers. The less the prospect needs us, the more we should seek his business.

A beginning in this direction has been made by the Pittsburgh Railways, which shows a condition directly opposite to the usual American complaint. On this property the peak or necessity riding has decreased in proportion, probably, to decreased employment. On the other hand, the off-peak or voluntary riding has increased. Better off-peak service through one-man cars and more attractive, more reliable equipment have helped to produce this result. However, the basic reason is the adoption of at least three fare plans that encourage off-peak patronage.

One of these is the 5-cent short-haul fare in use on more than a dozen routes. It encourages neighborhood shopping between the business peaks and neighborhood theater travel at night.

The second and most important of these plans is the weekly pass, of which some 60,000 are sold. As the pass rider cannot take more than two peak rides a day, it is obvious that his additional two or even four rides must be off-peak. They also tend naturally to be short-haul.

The third plan is the Sunday-holiday pass, which has proved that people in Pittsburgh will ride the trolley without compulsion.

These three schemes are far from exhausting the possibilities in pricing the ride according to quantity, length and time purchased. They do prove, however, that there can be no talk about ride salesmanship without differentiation in the rate of fare. Let more railways follow Pittsburgh's example and then we can have hopes for still greater refinements, more particularly in adding offpeak passes, as urged by the writer for years past.

WALTER JACKSON.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—STANDARDS—13

C.E.R.M.M.A. Inspection Rules and Uniform Charges

In the rules covering the condition and repair of freight cars for interchange service as adopted by the Central Electric Railway Master Mechanics Association May 11, 1927, and made effective Jan. 1, 1928, and as published in ELECTRIC RAILWAY JOURNAL for May 28, 1927, the following changes should be made:

In Standard No. 3, paragraph 1, last line should read: "The Central Electric Railway Master Mechanics Association. The words Master Mechanics have been added.

In the various inspection forms shown

added.

In the various inspection forms shown on standard sheets Nos. 7 and 8 the letters C.E.R.M.M.A. should be added so that they will read Form C.E.R.M.M.A. 1, 2, 3, 4, and 5. The same addition is to be made in the text wherever these forms are mentioned as in rules 2, 5, 6, 10, 12, 26 and 27. Fig. No. 2 has been given to the standard axle shown on standard sheet No. 7. On standard sheet No. 8 the renair card should have a heading "Central Electric Railway Master Mechanics Association instead of Master Car Builders Association.

instead of Master Car Builders Association.

On standard sheet No. 4 Fig. 2 should be changed to Fig. 3.

On standard sheet No. 5, rule 15, fourth line from the last, the word flat should be inserted before spot.

After rule 18 (c) the following should be added:

(d) No welding of axles is permissible except at the button which may be built up.

up.
In rule 21 Fig. 2 should be changed to

In paragraph (b) of the rule, third line, the words "in Fig. 3" should be inserted

The following paragraphs (d) to (p) inclusive should be added to rule 21 and

be made effective as of date Jan. 1, 1929.
(d) Periodic repacking of journal boxes, after the expiration of twelve months, as indicated by the steneiling on car, regardless of the responsibility of handling company for change of wheels or other re-

pairs.

(e) All journal boxes shall be jacked; all journal wedges and bearings removed for examination, and renewed where necessary; all boxes cleaned and repacked with properly prepared packing (new or renovated) in accordance with C.E.R. M.M.A. recommended practice, and car stenciled. Dust guards shall be renewed, when necessary, only where wheels or journal boxes are changed.

(f) The place (railroad and station).

journal boxes are changed.

(f) The place (railroad and station), month, day and year of repacking shall be stenciled on car body pear the hody bolster at diagonal corners with not less than 1 in. figures and letters, using the same station initial as is used for airbrake stencil. This provision also applies to new cars.

(g) No change shall be made in the stenciling unless all boxes are repacked and the work complete, in all details, has been performed.

(h) If car bears no stenciling showing

(h) If ear bears no stenciling showing date of previous repacking, all boxes may, if necessary, be repacked in accordance with paragraphs (e) and (f).

with paragraphs (e) and (f).

(i) This work shall be done only when cars are on repair track for other repairs.

(j) No charge shall be made for repacking, etc., if performed within twelve months from date stenciled on car.

(k) No charge shall be made for repacking, etc., unless all boxes are repacked and the work complete, in all details, has been performed.

(1) Work performed, in accordance with

the foregoing, may be charged to car owner at prices specified in Rules...... (m) Journal bearings having back or lug broken or cracked, or length reduced § in. or more, or lining loose, cracked, broken, spread over side or worn through to brass, shall be considered as requiring renewal.

renewal.

(n) Journal bearing wedges cracked, broken, or top radius worn flat lengthwise of wedge, shall be considered as requiring renewal. Care must be taken to see that wedges are not scrapped for wear unless top radius is actually worn flat

wear unless top radius is accuany flat.

(o) The periodic repacking, etc., does not contemplate any change in the ordinary attention as to oiling and packing when necessary.

(p) At time of periodic repacking inspection must be made of all axles for defects and limits of wear. If defects are found axles should be changed or owner notified on Form C.E.R.M.M.A.-1.

In rule 29 the last sentence should be omitted.

omitted.

In rule 37 the following should be added to the last sentence so that it will read "Standard safety appliances as applied to electric railways must be completely applied.

The following rules 38, 39 and 40 should be added.

The following rules 38, 39 and 40 should be added:
"Rule 38. Bills for repairs made under these rules and for material and labor furnished shall be in conformity with schedule of prices and credits for the articles enumerated plus 15 per cent. Bills shall not be rendered for less than \$1 but charges for a less sum than \$1 may be held till they amount to that sum."
"Rule 39. All worn out and defective

(Continued on next page)

Electric Railway Journal Maintenance Data Sheet ROLLING STOCK—STANDARDS—15

C.E.R.M.M.A. Uniform Charges—(Continued)

			Air	Brake	Material			
		in. oment		in. oment	8-i Equip Pc.		10-i Equip Pc.	
Item Details		Charge		Charge		Charge	No. C	harge
38 Triple valve slide valve	1729	1,21	29138	1.2!	60 Triple check valve case stud and nut 4887 61 Triple union gasket	0.08	4887	0.08
and rings	1725	3.22	1767	3.22	62 Triple emergency			
40 Triple main piston rings	10032	0.39		0.39	valve nut 1738 63 Triple emergency	0.08	1738	0.08
41 Triple slide valve	6520	0.05	6520	0.05	piston	$0.92 \\ 0.08$	1733 4886	0.92 0.10
42 Triple graduating valve	1732	0.09	29139	0.09	Fittings		a.	
43 Triple emergency piston	1733	0.77	1733	0.77	65 -in. pipe		0	narge
44 Triple emergency valve seat	1740	0.84	1740	0.84	66 ½-in. pipe		0	.06
45 Triple emergency valve	1735	0.93	1735	0.93	68 I-in. pipe		0	.08
46 Triple emergency valve rubber seat.	1737	0.02	1737	0.02	70 ½-in. elbow		0	.03
47 Triple check valve spring	1745	0.03	1745	0.03	72 1-in. elbow		0	.05
48 Triple check valve	12850	1,53	13392	1,53	74 ½-in. coupling		0	.04
49 Triple check valve	1754	0.05	1754	0.05	76 1-in. coupling		0	.07 .05
50 Triple valve check valve	1744 1751	0.39	1744 1751	0.39	78 1-in. tee		0	.06
51 Triple valve strainer 52 Triple union	1749	0.17 0.15	1749	0.17	80 I-in. tee		0	. 08 . 27
53 Triple union nut 54 Triple union swivel.	1750 1746	0.13	1750 1746	0.13	83 ³ / ₄ -in, union		0	.34
55 Triple cylinder cap 56 Triple graduating stem nut	1740	0.92	1746	1.13 0.29	84 1-in. union		0	.54
57 Triple cylinder gas- ket	1753	0.26	1753	0, 27				
58 Triple graduating stem.	1748	0.19	1748	0.22				
59 Triple cylinder bolt and nut	10836	0.06	10836	0.05				

APPENDIX (A)

APPENDIX (B)

WEIGHTS AND CHARGES ON NO. 930-A

AND	NO. 930 VAN DOR	N COUF	PLER PARTS
Part		Weight,	
No.	Description	Lb.	Charge
930-A	Head	260 {	\$32.75 blank 34.23 drilled
930	Head	240 {	30, 33 blank 31, 83 drilled
2114-C		80	12.30
2115	Lock	5.84	1.80
2116	Lever, unlocking	2.40	0.85
2117	Knuckle throw	3.60	1.10
1003 2119	Knnckle pin	7.50	0.52
2119	Unlocking lever pin	0.50	0.15 0.35
2118	Locking spring Washer, spring stop	1.12	0.33
1921	Lock set	4. 25	1. 25
2121	Stem, guide	1,23	0,40
2124	Pin, riveting		0, 12
1951	Uncoupling rod	10.94	0.92
2138	Uncoupling chain		0.68
2101		106.50	15, 98 blank
-101	Draft housing		17.40 drilled
2104	Draft voke	63	9.45
2106	Spacer	10	1.72
2109	Follower washer	7	1.50
2110	Draft spring (out-		
2120	side)	26	1.90
2128	Draft bolts and grip		0.00
2105	nut	4.00	0.98
2102	Draft spring (inside) Anchor	135	0.53 16.20
2147	Anchor pin	8.05	0.85
2127	Carrier bolt	1.50	0.25
2502	Carrier top	42.50	8.20
2503	Carrier bottom	14.50	3.80
2516	Carrier bracket	3,00	0.85
2517	Housing bracket	3.00	0.85
2078	Radial bar	84.50	5.10
2112	Radial bar thimble.	1.78	0.45
1669	Radial bar stop	0.85	0.15
835	Bracket	1.30	0.70
Abov	e charges F.O.B. Ch	icago, Ill.	

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK-STANDARDS-14

C.E.R.M.M.A. Inspection Rules and Charges—(Continued)

parts removed from foreign cars for which owner is responsible whose value now exceeds \$2 shall be tagged with date removed, car number and initial and kept for a period of 90 days, and same returned to car owner only in case car owner so requests. At the end of the 90-day period defective parts not returned are to be scrapped and credit given car owner in accordance with rules. In case defective parts are returned to owner memo giving

car number and initial and date removed must be attached to copy of freight bill sent to owner. If not otherwise arranged for, parts will be shipped charges collect." Rule 40. When angle cocks, cutout cocks, pressure retaining valves and release valves or detail parts of same, are renewed, ground in or otherwise repaired, account defective, charge shall be made for complete cock or valve and average credit allowed according to price schedule.

		in. oment		-in. oment
Item Details		Charge		Charge
21 1 2 x 22-in. hose with 1 1 -in. nipple and FP-5 coupling 21a 1 x 18-in. hose with	46242	\$2.05	46242	\$2.05
l-in. nipple and FP-4 coupling 22 l-in. self locking	46591	1.85	46591	1.85
angle cock 23 1-in, angle cock with	22416	2.45	22416	2.45
plain handle 24 1½-in. self locking		2.31		2.31
angle cock	22413	2.75	22413	2.75
24a Credit for fittings on 20a, 21 and 21a in good order		1. 27		1, 27
25 1-in, cutout cock 26 1-in, cutout cock,	2135	1.84	2135	1.84
average credit 27 14-in. cutout cock	2092	$0.94 \\ 2.64$	2092	0.94 2.04
28 11-in. cutout cock, average credit		1.05		1.05
29 1-in centrifugal dirt collector	75751	1.84	7 5 7 51	1.84
30 14-in, centrifugal dirt collector	75753	2.29	75753	2.29
31 Release valve	2416	0.92	2416	0.92
32 Release valve, average credit 33 Release valve rod		0.50		0.50
with or without cotter key and		0.08		0.08
staple		0.00	• • • • •	0.00
valve	3216-1	1,63	32161	1.63
valve, average credit	(H-I)	0.75	(11-2)	0.75
plete	1717	22.53	4870	22.53
37 Triple valve body- bushed	20220	8.86	20216	8.86

(Continued on next page)

Uniform Charges

APPENDIX (A) Air Brake Material

			Al	г вгаке	Material				
	8-i Equip Pc.	oment	Equip Pc.			8-i Equip Pc.	ment	10-i Eqnip Pc.	
Item Details	No.	Charge	No.	Charge	Item Details	No.	Charge	No. (Charge
I Brake cylinder and reservoir complete C Cylinder body	No. 69816 67928 1246 3626 1217 2305 1142	Charge \$20.35 6.60 2.07 0.83 1.32 0.06 0.14 0.69 0.83 0.05	No.	\$25.58 7.70 2.71 0.83 2.07 0.06 0.42 0.83 0.83 0.05	Item Details 16 l½x22-in, draw barhose with tapped and union nipple for l-in, pipe 17 l½x22-in, draw barhose with tapped and union nipple for l-in, pipe, credit for fittings 18 l½x22-in, draw barhose with tapped and union nipple for l½-in, pipe 19 l½x22-in, draw barhose with tapped and union nipple for l½-in, pipe 19 l½x22-in, draw barhose with tapped and union nipple for l½-in, pipe, label pipe	No. 46622	\$1.90 0.56	No. 0	\$1.90 0.56
12 Reservoir stud and					credit for fittings		0.72		0.72
nut. 13 Reservoir and drain plug 14 Reservoir cylinder bolt and nut 15 Reservoirdrainplug	4887 2439 4889 33310	9.08 0.06		11.00 0.06	20 1\(\frac{2}{6}\) x 22-in, hose with 1-in, nipple and FP-4 coupling 20a 1\(\frac{2}{6}\) x 18-in, hose with 1\(\frac{2}{6}\) in, nipple and FP-4 coupling				

Electric Railway Journal Maintenance Data Sheet

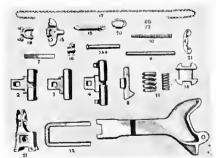
ROLLING STOCK-STANDARDS-16

C.E.R.M.M.A. Uniform Charges—(Continued)

APPENDIX (C)

Tomlinson M.C.B. Car Coupler

FORM 12-REPAIR PARTS



Cat.			
No.	Part Description		Charge
14495	1 Coupler body with	knuckle	
	apringa		\$30.00
10673	2 Standard split knuckle		9.00
11024	3 Solid knuckle		10,00
14485	4 High knuckle, 16-in		11,50
14236			
14486	6 Knuckle pin for high kn	uckle	0.90
14237			0.25
14497			5.00
13884			0.30
13885			0.40
12831	11 Tailpiece		7.50
12832			4.25
12833			2.25
12834			2.50
12835			2.00
12836			
	bolts		

Cat.			
No.	Part	Description	Charge
12837	17	Uncoupling chain, 13 ft. long	\$1.50
12838	18	Uncoupling hook with spring	. 1.50
13277	19	Uncoupling bracket with pin	. 1.00
12840	20	Uncoupling handle	. 0.30
13108	21	Pipe support	. 0.50
14965	22	5 in, repair link	. 0.06

Tomlinson M. C. B. Car Coupler FORM 13



Nσ.

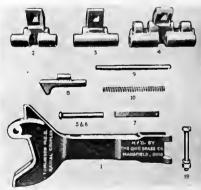


Plece 11, Draft Genr

Tomtinson M.C.B. Car Coupler

FORM 13-REPAIR PARTS

Coupler Parts

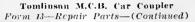


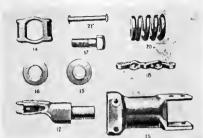
Cat.			
	rt .	Description	Charge
14495	Coupler	body with	kouckle
	springs		\$30,00
10673	2 Standard s	plit knuckle	9.00
11024	Solid knuc	kle,	10.00
14485 4	High knuc	kle, 16 in	11.50
14236	5 Knucklepi	nforstandar	dknuckle 085
14486	Knuckle p	in for high l	nuckle., 0.90
14237	Knuckle a	pring	0.25
14497	B Forged slice	ling lock	5.00
13884	9 Sliding loc	k pull rod	0.30
13885 10	Sliding loc	K spring	0.40
	Draft gear		
	2 Tailpiece,.		

(Continued on next page)

Electric Railway Journal Maintenance Data Sheet ROLLING STOCK—STANDARDS—17

C.E.R.M.M.A. Uniform Charges—(Continued)





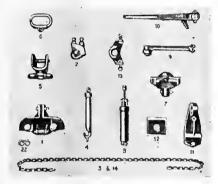
Cat.	20.00	Description	Charge
INO. I	MIL	Description	Charge
14500	13	Draft gear housing	\$13.00
14501	14		3.25
14502	15	Front follower	1.00
1450 -	16	near follower	0.80
14504	17	Draft bolt	1.90
14505	18	Pipe cleat with bolts and lock	
		washers	1,00
14496	19	12-in.x9!-in, large holt with nut	
		and lock washer	1.25
14464	20	Draft spring	2.25
14471	21	Follower block pin with 1-in.	
	- 1	cotter	0.50
	То	milnson M.C.B. Car Coupler	

FORM 13-REPAIR PARTS

Chain Uncoupling Parts

No.	Part	Description	Charge
12835	1 D	ouble sliding clevis	\$2.00
12836	2 C	nain guide with attachment bolts	





Tumlinson M.C.B. Car Coupler FORM 22-REPAIR PARTS



0 .			
Cat.	Part	Description	Charge
15207			
13207	- 1	Coupler body with knuckle	
		springs, sliding lock spring seat	
		and channel support	\$52,50
15208	2	Standard 16-in. nigh split	
		knuckle	15.0 0
15209	3	113-in, high split knuckle	11.50
15210		Knuckle pin with 1-in. cotter	
		for 16-in. knuckle	1.00
14458	4	Knuckle pin with 1-in. cotter	
11130		for 113-in, knuckle	1.00
14237	5	Knuckle spring	0.25
15211	2	Forged sliding lock	6.50
15212	9	et the lead and and	0.65
		Sliding lock guide rod	
15213	- 8	Sliding lock spring	0.25
15214	9	Sliding lock clevis with pin and	
		cotter	0.75
14674	10	Draft spring-61x8-in. Harvey	6.00
14675	- 11	Draft gear follower	2.50
14501	12	Draft gear follower block	5.00
15215	13	Draft gear bolt with 1-in. cotter	9.00
15216		Tailpiere	14.00
14471	15	Follower block pin with 4-in.	
	17	cotter	0.50
		COUCELLATION	4.70

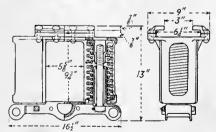
(Continued on next page)

Electric Railway Journal Maintenance Data Sheet ROLLING STOCK—STANDARDS—19

C.E.R.M.M.A. Uniform Charges—(Continued)

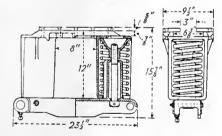
M.C.B. Spring Draw Bar Carrier FORM 14





Cat.		
· No.	Description	harge
14429	Form 14 carrier for use with M.C.B.	
	coupler	18.00
14430	Body casting with jaws for Form 14	
	carrier	9.50
14431	Yoke casting for Form 14 carrier	3.50
13558	Outer coil spring for Form 14 carrier	1.00
14432	Inner coil spring for Form 14 carrier	0.75
14433	Jaws, front and rear, with rivets for	
	carrier body, per pair	2.00

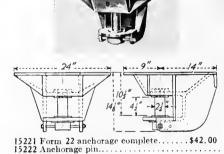
M.C.B. Spring Draw Bar Carrier FORM 23

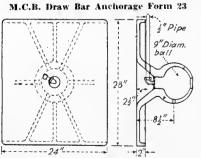




Cat.		
No.	Description	Charge
15233	Form 23 carrier complete	\$34.00
15234	Body casting with jaws	17.00
15235	Yoke with clamping set screws and	
	lock nuts	
15236	Coil spring	0.85
15237	Jaw with rivets for carrier body, per	
	pair	
14781	Spring cap nut	1.25

M.C.B. Draw Bar Anchorage Form 22



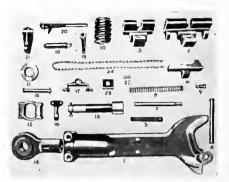


15232 Form 23 Anchorage complete..... \$37.50

Electric Railway Journal Maintenance Data Sheet ROLLING STOCK-STANDARDS-18

C.E.R.M.M.A. Uniform Charges—(Continued)

Tamlinson M.C.B. Coupler Form 22-Repair Parts-(Continued)



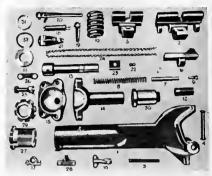
Cat. No.	Part	Description	Charge
15217	16	Pipe cleat	\$0.65
15218	17	Chain guide with attachment	
		bolts	1.00
15219	18	Spring barrel	4.25
15220	19	Center lever	0.65
14527		Side lever	1.60
14528		Side bracket	1.15
14529	23	Center bracket	0.30
14531		Uncoupling chain, 7 ft. long	0.65
14961	22	-io. repair link	0.07

Tomlinson Form 23 M.C.B. Coupler Repair Parts



No.
15223— Complete M.C.B. Form 23 coupler equipment for single end, including coupler with draft gear, anchorage, nucoupling device, spring draw bar carrier and slide bar with supports. . . . \$230.00

Cat.			
No.	Pari	Description	Charge
15224	- 1	Coupler body with knuckle	
		springs, draft gear bushing and	
		coannel support	\$57.50
15208	2	Standard 16-in. high split	
		knuckle	15.00
15209	3	111-in, high aplit knuckle	11.50
15210	4	Knuckle pin with 1-in. cotter	
		for 16-in. knuckle	1.00
14458	4	Knuckle pin with \in. cotter	
		for 114-in, knuckle	1.00
14237	5	Knuckle spring	0.25
15211	6	Forged sliding lock	6.50
15225	7	Sliding lock guide rod	0.70
15226	12	Sliding lock guide tube	0.70
15213	8	Sliding lock guide spring	0.25
15214	9	Sliding lock guide clevis with	
		pin and cotter	0.75
14674	10	Draft spring-61x8-in. Harvey.	6.00
14675	-11	Draft gear follower	2.50
14670	14	Tail socket	20.00
15227	15	Tail socket cap	13.00
14672	25	Tail socket bolt with castle nut	
		and cotter	1.00
14673	26	Tail socket shim	0.03
14676	13	Draft gear bolt	8.50
15228	27	Draft gear nut	8.50
		7	



Cat.		,	
	art	Description	Charge
14678	28	Draft gear nut lock	\$0.45
15229	29	Draft gear packing nut	3.00
15230		Draft gear bushing	9.00
14680		Draft gear packing riog	0.70
14681		Draft gear packing	0.30
15217	16	Pipe cleat	0.65
15231	17	Chain guide with attachment	
		bolts	0.70
15219	18	Spring barrel	4.25
15220	19	Center lever	0.65
14527	20	Side lever	1.60
14528	21	Side bracket	1.15
14529	23	Center bracket	0.30
14531	24		0.65
14961		-in. repair link	0.07
, ,,,,,,			

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK-STANDARDS-20

C.E.R.M.M.A. Uniform Charges—(Continued)

EXHIBIT (D)

Buffalo Brake Beam Company, Buffalo, N. Y.

Per Car	Item	Description or Print	Charge Each
4 Spri 8 Dns	ng shims et guards et guard wedges	Oak 13 x 115 x 1 ft. 0 in Print 1415577 Cottonw. 1 3 15 x 15 x	\$0.61 0.25
4 Col	umns—R.H	0 ft. 9%-in Print 5415305	0.13 6.36
8 Col 16 Jou 8 Bra 2 Lev 2 Bot	umn bolts rnal box bolt ke beam hanger er guides tom connections tom arch bar	1\frac{1}{2}x22\frac{3}{4} with nut 1\frac{1}{2}x16\frac{5}{2} with nut Print 1415352 Print 1415351 Print 1415358	0.68 0.29 1.07 0.80 2.96
4 Bra 4 Bot 4 Top 4 Tie 2 Live 2 Dea 2 Spri	tom aren bar ides ke beam safety tom arch bars arch bars bless clevers dlevers mg planks imn bolt lock	Print 1415356 Print 1415353 Print 1415355 Print 1415355 Print 1415355 Print 1415349 Print 1415349 Print 1415354	0.32 0.51 7.98 6.78 2.16 1.67 1.71 8.23
wa	shers	Print 1415362	0.033
wa	sherke beam hgr.	Print 1415363	0.027
10 Bra 2 Bra	L-6	Print 1415357ts, cotters, etc.	0.258 0.202 0.21
4 Axle	eels ea †Second hand.	33-in. steel { A. R. A. 5x9-in. } rough turned.	*30.00

C.E.R. M.M.A. Standard Truck Parts Description or Print $_{\rm Car}^{\rm Per}$ Item 2 Bolsters..... \$68.58 8 Journal boxes..... 8.24 8 Journal bearings.... 3.22 8 Journal wedges.... 0.75 8 Brake shoes..... 1.40 0.075 8 Brake shoe keys... No. Required | Each | No. 2 beams complete as shown | print B-1402. | \$4.50 | Brake heads. | 1.00 | Channel | 0.95 | Rods. | 0.95 | Nuts. | 0.12 2.00 1.00 0.95 0.95 0.24 \$5.14

Per Car	Item	Description or Print	Charge Each
4 Sprin	gs	A.R.A. Std. class C, with spring plates	\$6.30
F.o.b.	destination in	base territory. e, not per truck, an	d pieces

are shown as per car set, not per truck.

APPENDIX (E)

Car Body

Car Body

86 No credit to be allowed for scrap lumber when renewing doors, floors, or other parts constructed in whole or in part of work.

95 Altering height of car body to keep couplers at proper height to be charged at cost.

106 Any car requiring general repairs due to owners defects on which the estimated cost of repairs exceeds \$150 shall be inspected by the bandling line and a careful estimate made of the cost of necessary repairs and forwarded to car owner, who will then inspect the car if he so desires, shall within thirty (30) days authorize repairs or further disposition of the car, shipping to handling line such material as he may see fit for use in repairing car. In case repairs are to be made by handling line.

107 In no case shall the total charge for actual repairs exceed the testimate by more than \$50.00 unless authorized.

108 If the owner authorizes destruction of car, handling line shall allow credit for all material at aerap prices less labor required for destruction.

Association Activities

International Association to Meet in Rome, May 6-12

THE Union Internationale de Tramways, de Chemins de Fer d'Intérêt Local et de Transports Publics Automobiles has set the days of May 6-12 for its meeting in Rome, Italy, this year. A feature of this meeting is that it will mark the consolidation of this association with the former Internationaler Strassen- und Kleinbahnverein. This means a return to the conditions existing before the war, when there was only one association representing the street railway, interurban railway and bus interests in Europe.

The detailed program of the Rome meeting will soon be made public.

COMING MEETINGS

Electric Railway and Allied Associations

Jan. 16-17—Midwest Electric Railway Association, Arlington Hotel, Hot Springs, Ark.

Jan. 18-19—Kentucky Association of Public Utilities, annual meeting Brown Hotel, Louisville, Ky.

Jan. 18-19—Central Electric Traffic Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 25—Central Electric Railway Master Mechanics' Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 25-26—American Railway Association, Motor Transport Division, organization meeting, Palmer House, Chicago, III.

Jan. 25-27—Electric Railway Association of Equipment Men, Southern Properties, Roosevelt Hotel, New Orleans, La.

Jan. 26-27—Central Electric Railway Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 31—New York Electric Railway Association, annual meeting, Hotel Commodore, New York, N. Y.

Feb. 13-17—American Institute of Electrical Engineers, winter convention, New York, N. Y.

Feb. 17-18—Central Electric Railway Accountants' Association, Hotel Gibson, Cincinnati, Ohio.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

July 8-12—Publio Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention, Cleveland, Ohio. A recent letter from the secretary of the association says the association would be very glad to have any members of the American Electric Railway Association participate in the Rome convention, and they are cordially invited to do so.

A preliminary program of the Rome meeting was published on page 278 of the issue of this paper for Aug. 13, 1027

A.R.A. Motor Transport Men to Organize

PERMANENT organization of a Motor Transport Division of the American Railway Association will be effected at a meeting called for Jan. 25 and 26. It will be held at the Palmer House, Chicago. This meeting, which has been called by President R. H. Aishton of the A.R.A., will also give an opportunity for discussion of the scope of the work to be covered by the new division. The organization is in the together the development freight and may study from, and, the most effected at a meeting called for Jan. 25 and 26. It will be held at the Palmer House, Chicago. This meeting, which has been called by President R. H. development freight and may study from, and, the most effected at a meeting called for Jan. 25 and 26. It will be held at the Palmer House, Chicago. This meeting, which has been called by President R. H. development freight and may study from, and, the most effected at a meeting called for Jan. 25 and 26. It will be held at the Palmer House, Chicago. This meeting, which has been called by President R. H. development freight and may study from, and, the most effected at a meeting called for Jan. 25 and 26. It will be held at the Palmer House, Chicago. This meeting, which has been called by President R. H. development and proportunity for discussion of the work to be covered by the most effected at a meeting called for Jan. 25 and 26. It will be held at the Palmer House, Chicago. The meeting which has been called by President R. H. development from a may study from and the most effected at a meeting called for Jan. 25 and 26. It will be held at the Palmer House, Chicago. The meeting which has been called by President R. H. development and proportunity for discussion of the control of the most effect and the most

hands of a general committee, of which A. P. Russell, vice-president New York, New Haven & Hartford Railroad, is chairman. G. M. Campbell, assistant to the secretary of the A.R.A., has been appointed secretary of the Motor Transport Division.

It is planned to distribute the activities of the Motor Transport Division of the American Railway Association among three sections, to study the application to steam railway service of the motor coach, the motor truck and the rail motor car respectively. The purpose of the organization wil be to bring together the railways interested in the development of motor transportation, freight and passenger, in order that they may study the problems arising therefrom, and, through co-operation, devise the most effective means possible for the development of such transportation. The membership in the division will be confined entirely to representatives of railways or their subsidiary operating

American Association News

Engineers' Response Increasing on Letter Ballots

RETURNS on the letter ballots sent out by the American Electric Railway Engineering Association show increased response and indicate that as the new method of voting on engineering standards becomes better understood it promises to give far better results in the adoption of new engineering standards than did the old method of voting on the convention floor.

The first letter ballot, dated Sept. 17, included six standards that were submitted for approval. Three items were included in the second group of proposed standards in the letter ballot dated Nov. 2. The ballots received have all been counted. The returns on the second group were more than twice those received on the first group. The vote showed a large majority in favor of the adoption of the three recommendations submitted.

A third group of questionnaires is now before the engineers of the industry. These questionnaires are dated Nov. 25 and include rolling stock ballot R.S. 13, covering limits of wear at points affecting the maintenance of proper gear centers; way and structures ballot W.S. 2, covering minimum dimensions for center plates on single and middle frogs, and way and structures ballot W.S. 6, covering rules for arc welding and specifications for welding rods. Returns on this third group of ballots are coming in

strongly and promise to exceed the returns received on the second group.

G. C. Hecker, special engineer of the association, who has charge of the compilation of these returns, reports that the response to this method of voting, as the use of the letter ballot becomes better understood, indicates that the new plan is working out successfully and promises to give a far more representative vote of the industry in the adoption of new standards than was formerly obtained in the old plan of voting on the convention floor.

Bulletin to Give Committee Lists

PUBLICATION of the membership lists of the various association committees will be in the form of a separate bulletin this year. This was decided on at a recent meeting of the publications committee of the American Association. This list will be accompanied by a general index of all committee members, giving their complete addresses and business connections. The committee lists will not be published in *Aera* each quarter as heretofore.

It is not expected that copies of the bulletin will be sent generally to Aera subscribers, but a copy will be sent to each committee member as well as to each company member. Additional copies will be sent to any other association member on request to J. W. Welsh, general secretary, 292 Madison Avenue,

New York City

News of the Industry

New York's Governor Discusses Home Rule and Buses

In his message to the Legislature of New York Governor Smith said:

This decade has seen several changes in our administrative policy toward public utilities. There is no need to rehearse the past. We have wavered from unified control to separation of functions. At present we have the Department of Public Service for state-wide regulation with the Transit Commission as a part of it having local jurisdiction in the city of New York. Construction of transit facilities in New York City is now entirely account. York City is now entirely removed from state control and lodged in a local Board of Transportation. This is at least a parof Transportation. This is at least a partial recognition of the home rule principle.

All along I have stood for the right of a locality to regulate a public utility operating wholly within its borders upon the theory that the service is being rendered to the people of a single city and the elected officials of the city are held responsible in the first instance. The people look to them and not to the state. There is also no reason why the state should not delegate its police power for the regulation of public will the property elected of public will the property elected of public city in the property elected of the property elected. utilities to the properly elected officials

of a municipality.

Transportation is so vital to the needs of every community that there is no reason why a municipality should not be permitted to supply it to its citizens. If that be true to supply it to its citizens. If that be true there is no reason why a city should not be permitted to operate public buses for the convenience and comfort of its citizens. There is nothing new or revolutionary about the theory of municipal ownership. New York City owns and operates ferry boats. Four cities of the state own and operate their electrical plants. A large number of villages either generate their number of villages either generate their own electricity or own a distributing system. Some villages operate gas plants. I simply recommend that the principle now in practice in New York City and in other parts of the state be extended to all forms of utilities and be made applicable to all cities wherever there is an expressed desire on the part of the majority of the citizens for the exercise of such a right.

Traction Not Included in Illinois Session

In calling a special session of the Illinois General Assembly to meet on Jan. 10. Gov. Len Small failed to include traction as one of the subjects to be considered. This makes it impossible to proceed with the proposed settlement of the Chicago railway problem prior to the regular session of the Legislature in 1929 unless another special session is called. It is being proposed that after the subjects in the present call are disposed of by the Legislature, another call should be issued by the Governor including all subjects relating to Chicago traction. There is considerable support of this plan in the city administration and the City Council has adopted a resolution urging the Governor to make such à call.

One of the subjects relating to traction may not be included. This is the proposed provision giving the city authority to spread special assessments for subway construction over a longer period than five years. Corporation Counsel Samuel A. Ettleson has found a provision in existing law which he believes gives the city this authority. For terminable permits, repeal of the existing 20-year franchise limitation and authority permitting the elevated and surface lines to consolidate, legislation

is necessary under the plan being considered.

If another call is agreed upon including these subjects it can be issued before the end of the present special session, making consideration of transit really a continuation of this session. Decision on this matter rests entirely with the Governor, who has frequently stated that he would not call a special session unless both the utilities and the city were in agreement on the bills that are presented.

Continuation of Public Control Urged

Division of Metropolitan Planning would change name of Elevated to Boston Transit Company, realign financial structure and carry out plans for \$40,000,000 expenditure

WITH more certainty of its facts VV and the legal status of its plans the Division of Metropolitan Planning of the Metropolitan District Commission has submitted to the Massachusetts Legislature for 1928 new plans for the expansion of the Boston Elevated, to cost about \$40,000,000. Henry I. Harriman is chairman of the division, and associated with him are A. C. Ratshesky, Ralph S. Bauer, Richard K. Hale, Everett E. Stone, Frank H. Hall and James B. Noyes, and they are unanimous in their recommendations.

Two problems relating to the Boston Elevated Railway confront the Legislature. First, such legislation as is required to insure the immediate construction of much-needed additional rapid transit facilities, and, second, a determination of the policy of the Commonwealth as to continued public control of the road. Both of these problems were before the Legislature in 1927. The Supreme Court has said that the Legislature has the right to provide for the re-arrangement of the securities of the elevated road in the manner agreed upon last year in the ioint legislative committee on metropolitan affairs and street railways. The Supreme Court has decided also that betterments may be assessed in connection with the rapid transit line extensions. This clears the way for legislation this year which could not be acted upon last year

The division reports that it cannot recommend the return of the road to the stockholders and the resumption of private management, cannot advocate the cancellation of a state option to purchase the road at millions less than its reproduction value and "cannot favor a policy which might foist increased fares upon the car riders of the Metropolitan

Accordingly, the division again reports in favor of a continuation of pub-

lic control under somewhat new conditions which it deems equitable to both the public and to the company.

The bill which the division reports for the re-organization of the elevated railway contains the following important provisions:

1. A change of the name of the corporation to the Boston Transit Company

2. An extension of the period of public control for a period of fifteen years, public control thereafter to be continued in force until repealed by legislative enactment.

3. The division feels that with an extension of public control for a period of 25 years or longer it would be reasonable to reduce the guaranteed dividend rate on the common stock to say 5½ per cent, thus effecting a saving of \$125,000 per annum, but that with a shorter period of public control a reduction of the dividend rate is not warranted. While the saving resulting from a lower dividend rate on the common stock would be desirable, the division feels that the gain thus effected would not equal the advantage to the Commonwealth of being able to review the whole Elevated situation at the end of a fifteen-year period. Accordingly the division recommends a fifteen-year extension without a reduction in the dividend rate on the common stock.

4. The transfer of the three classes of preferred stocks now outstanding into in-come bonds, this being accomplished either by voluntary exchange or by eminent domain proceedings. The income bonds would bear interest at 4 per cent per annum, would be guaranteed by the Commonwealth as to both principal and interest, would be tax free in Massachusetts, would run for a period of 40 years and would carry a sinking fund that would retire them before maturity.

If 4 per cent income bonds are issued in exchange for outstanding preferred stocks on the basis hereinafter outlined the sav-ings in dividends and in state and federal taxes will be about \$1,175,000. This sum should be set up as a fund to be used for the following purposes:

(a) To create a sinking fund which will retire the income bonds at maturity.

(b) To retire the deht of \$2,200,000

which the Elevated now owes the cities

and towns served by it.

(c) Any balance to be used for the payment of interest and sinking fund on additional rapid transit facilities.

5. In order that the income bonds to be issued under the proposed reorganization act shall sell at par it will be necessary that they carry the guarantee of the Com-monwealth and that they be made tax free in Massachusetts.

6. Rotation in the term of service of the public trustees, one trustee being appointed

every two years.
7. Acceptance by the elevated road of a bill calling for additional rapid transit facilities substantially as provided in the second bill accompanying this report.

8. Acceptance of this act by a majority of all the stockholders entitled to vote at a meeting held for that purpose, stockholders voting as a whole and not by classes.

The elevated road now has outstanding approximately \$24,000,000 of common stock upon which 6 per cent dividends are paid and three classes of preferred stock, as follows:

First preferred 8 per cent stock	\$6,400,000
Second preferred 7 per cent stock	13,650,000
Preferred stock 7 per cent	3,000,000
Total	\$23,050,000

The dividends on these preferred stocks amount to about \$1,675,000 a year. The \$3,000,000 of 7 per cent stock is callable at 105. The first and second preferred stocks are not, however, callable and must therefore be acquired either by voluntary exchange or by eminent domain proceedings, and the bill accompanying this report provides for voluntary exchange, so far as the stockholders are willing to exchange, and for the condemnation of the balance of the stock.

The division suggests that the preferred stock be exchanged into 4 per cent income bonds, the bonds running for a period of 40 years, carrying a sinking fund which will retire them in that period, and having the guarantee of the commonwealth of both principal and interest. Last year the recommendation was for a 4½ per cent bond, but money rates are now easier. The division says it cannot be denied that thus far the state has treated the stockholders of the elevated both fairly and generously and it believes that fair dealing warrants the continuation of that policy.

Accordingly the division suggests that the owners of the three classes of preferred stock be permitted to exchange their securities into 4 per cent income bonds at the following share prices:

8 per cent first preferred stock	130
7 per cent second preferred stock	115
7 per cent preferred stock, its call price of	10ς

These prices are substantially higher than present market quotations and in the opinion of the division should be attractive to the stockholders of the road.

As the division sees it, an exchange of the preferred stocks on the above basis would call for the issuing of a little less than \$27,200,000 of bonds, upon which the maximum interest

charge would be about \$1,100,000, thus effecting a saving of \$575,000 over the present dividends on the preferred stocks.

The division estimates the savings as follows:

Dividends on preferred stocks	\$575,000 260,000 340,000
Total	\$1,175,000

Of the above savings \$300,000 a year should be set aside as a sinking fund to retire the new income bonds of the road. An annual sinking fund of that size invested in the income bonds, which should be callable for the sinking fund, will retire them by the end of the 40-year term for which they are to be issued. The division says:

The elevated road now owes the cities and towns served by it approximately \$2,200,000. This represents moneys which the cities and towns advanced through the Commonwealth to the elevated to meet the guarantees of the public control act when its earnings were insufficient. This money should be promptly repaid. We accordingly recommend that, after setting aside the sinking fund of \$300,000 as above provided, the balance of the savings effected be first used to repay this debt to the cities and towns. When that debt has been re-paid, we recommend that the savings thereafter be set up in a reserve fund which shall be used to pay the interest and sinking fund on additional rapid transit exten-Any rapid transit extensions will necessarily take several years for construc-tion and during the construction period, the interest and sinking fund on such expenditures are carried as a part of the construc-tion cost. Accordingly the debt to the cities and towns can be repaid before any lease by the elevated of new rapid transit facilities goes into effect.

The total annual savings to be effected by the plan outlined in this report are estimated at \$1,175,000. From this saving must be taken the \$300,000 required for the sinking fund for the income bonds. There will thus be left \$875,000 which can be applied to the payment of interest and sinking fund charges on new subways and rapid transit facilities. This means the carrying charges on approximately \$20,000,000 of such expenditure and makes possible the immediate construction of new subways.

Turning to the question of extension of lines the division finds that a comprehensive rapid transit plan can now be authorized with every prospect that it will not add any burden to the car riders of the Metropolitan area. It accordingly recommends the immediate construction of two new through rapid transit routes which can be built at an estimated cost of from \$35,000,000 to \$40,000,000, and also an extension of the Washington Street rapid transit route from its present northerly terminus in Everett to Malden and Saugus.

The total length of the two lines is approximately 14 miles, of which about 27.500 ft. will be existing subways or viaducts, 25.000 ft. new subways or viaducts and 20,500 ft. on private rightsof-way adjacent to railroads.

Chicago Parking Ordinance Effective Jan. 10

To enforce the prohibition of parking in the loop district in Chicago will require the service of at least 400 traffic policemen, according to Frank J. Matchett, head of the police traffic division. The ordinance prohibiting parking was intended to become effective on Jan. 2, but because of time required for publication it will not go into effect until Jan. 10. Under the terms of the ordinance, parking will be barred from practically the entire central business district. It is the intention of city authorities to apply the law strictly to all persons and not to permit anyone to park on the streets affected during the time specified, from 7 a.m. to 6:30 p.m. on weekdays, except Saturday.

A Magazine in St. Louis Seeks a Name

A new monthly magazine will be published in the interest of employees of the St. Louis Public Service Company, St. Louis, Mo., in lieu of the United Railways Bulletin, which was withdrawn from publication at the end of the receivership on Nov. 30. Suggestions for a name must be in the hands of the editor of the magazine not later than Jan. 15 in time to publish the first issue of the book under its new title in February. The best choice of name will win \$25 in cash and there will be a second and a third prize of \$15 and \$10. Only street railway employees not holding official positions and members of their families or especially foremen, supervisors, inspectors, motormen and conductors and other employees are eligible to compete for the prizes. Mean-while the space for the title on the cover page was vacant in the December issue and will be also in the January issue.

Carols from a Houston Car at Christmas

During the week preceding Christmas, residents of Houston, Tex., were treated nightly to Christmas carols provided by the Houston Electric Company, working in conjunction with the musical section of the recreation department of the city. A specially decorated flat car, with a different band each night, was routed over various lines so that the entire city was covered during the week. This unusual way of lending atmosphere to the Christmas season attracted much attention and many families in the residential sections of the city waited up to greet the carolers while in their neighborhood.

Three days before Christmas all the cars and buses of the Houston Electric Company were decorated inside with paper bells and wreaths, while appropriate dash posters were run on the

outside of the cars.

Paving and Fare Orders in Mobile

The Alabama Public Service Commission has issued an order allowing the Mobile Light & Railroad Company to take up the track and abandon service on the 2,331 ft. of route of the Charleston-Beauregard line on Texas Street, Mobile, Ala. It is the intention of the city to pave Texas Street and as the Charleston-Beauregard line is an unprofitable one the commission issued the order to give the company relief from paving.

The commission also increased the token rate from four tokens for 28 cents to four tokens for 30 cents. Rates of fare now are: Cash fare, 8 cents; token fare four for 30 cents, $7\frac{1}{2}$ cents; school tickets, books of 30, $3\frac{1}{2}$ cents; second zone, cash fare, 6 cents, and transfers, each 1 cent.

Twin City Lines Extends Xmas Greetings

An unusual Christmas greeting in the form of a newspaper advertisement, entitled "What He Left Behind Him, was extended by the Twin City Lines to all of its patrons. The message printed the last will and testament of a patient in a Chicago poorhouse which was found in his ragged coat pocket. Close investigation disclosed that the writer had been a lawyer and because of its unusual content, the will was probated and made part of the record of Cook County, Illinois. The old patient, Charles Lounsberry, made no disposi-tion of his worldly goods as he had none to leave, but he left something to good fathers and mothers in trust for their children; he left wonderful things to children but only for the term of their childhood, also to lovers and young men, and to those who were no longer children or youths or lovers, he left memory. The message is worth reading and the spirit of the Twin City Lines in offering this as its Christmas greeting is worth emulating.

Who Is a Nominee in Louisville?

Each employee of the Louisville Railway, Louisville, Ky., has been urged to bring to the attention of the award committee, on a form which may be obtained from his foreman, the record of any fellow employee whom he feels is entitled to the Anthony F. Con-nelly award for the designation "Best Public Servant." All employees are urged to state as fully as possible the reason for their belief that the nominee has rendered the greatest public service during the past year. Nominations can be made any time up to Jan. 10 and the award committee will make its selection and announce the award as early as it is possible to do so. This award carries an annual cash prize of \$75 and a medal known as the Connelly award, to be given to that employee of

the Louisville Railway or one of its subsidiaries who has during the calendar year rendered, in his individual capacity, the most useful or efficient service to the public which the railway

An Ingenious Plan to Return to the Five-Cent Fare in Seattle

Return of the 5-cent fare on the Seattle Municipal Railway, Seattle, Wash., again becomes a possibility. First steps have been taken to place before the voters of the city a definite proposal for assistance for the municipal railway from the general fund. A 'plan or system" ordinance authorizing a tax levy up to 3 mills has been prepared by Corporation Counsel T. J. L. Kennedy and turned over to Councilman Oliver T. Erickson, sponsor of the idea, for introduction in the City Council. It is proposed to place this plan before the voters at the March 13 election. If the ordinance is ratified by a three-fifths vote, it will enable the Council to proceed with the new plan. Under the proposed plan, the Council would be empowered to aid the railway annually with money from the general fund to make up deficits anticipated during the year, provided the appropriations did not exceed 3 mills of the tax levy.

Educational Films Supplied by South Shore Line

Establishment of a motion picture library and free lecture service-available without charge to any individual or organization that applies—has re-cently been announced by the Chicago, South Shore & South Bend Railroad, Michigan City, Ind. The service includes the furnishing of a trained speaker and operator, projector, screen and a representative selection of films telling the story of cities, recreational opportunities and industries along the South Shore Line.

Titles of the films now available are as follows:

Chicago, the Metropolis of the Midwest (2 reels).

Gary, the Steel City.

Michigan City, the Summer Resort Capital of Indiana.

South Bend, in the Beautiful St. Joseph Valley.

Vacationland Along the South Shore

Two stereopticon films, furnished with the same accompanying service as the motion pictures are ready for release to persons interested: "Our Silent to persons interested: "Our Silent Guardians," a non-technical series describing the operation of South Shore Line automatic block signals; and "Riding on Lightning," a description of the electrical equipment of South Shore Line cars, also presented so as to be readily comprehended by the layman. Bookings for films and lectures are made through the newly organized Public Speakers' Bureau of the South Shore

Transit Policy in Philadelphia Outlined

Upon his induction into office as Mayor of Philadelphia, Pa., Mr. Mackey promised the negotiation of a transit agreement in harmony with the Philadelphia Rapid Transit Company and in co-operation with the Council and the Public Service Commission, He said that of all the problems confronting the administration local transportation was the most important. He believed that Philadelphia to become a greater commercial center must improve and enlarge its transportation facilities. The task had already been simplified by the work done by the present management of the Philadelphia Rapid Transit System, which during its period of incumbency has converted the system from the poorest to one of the best and most efficient. He said he would be guided in the matter of transit by the facts in the case, but that he was convinced that he could rely upon the co-operation of the railway management in furthering any program which had for its object the greatest good for the greatest number.

Specifically speaking, he said that the Broad Street subway should be put in operation as a part of the Philadelphia Rapid Transit System with free transfers. Early completion of feeder lines and adequate downtown terminals were necessary, and in order that the time of the administration spent in negotiation with the company might not be nullified by subsequent disapproval by the Public Service Commission he proposed to invite the commission and the company to collaborate in bringing forth a plan fair to both the city and the company, and to this end he bespoke the co-

operation of the City Council.

Turkeys and Hams Awarded in Jacksonville

Another successful safety contest for trainmen of the Jacksonville Traction Company, Jacksonville, Fla., has closed. John P. Ingle, manager of the railway, said the contest revealed that accidents are on the decrease and that the contest was the most successful in the history of the company. As an appreciation for the records made during the 100-day contest, 114 trainmen were presented turkeys for Christmas and 32 conductors received hams.

The contest developed two star operators, R. T. Chism and L. Lammons, who operated more than 9,000 miles each without a single chargeable acci-Winners operated for approxdent. imately 275,000 miles during the drive, which opened Sept. 10, at the close of a successful mid-summer campaign. present drive closed Dec. 18. While more than half of the men who participated in the company's latest drive won first honors, seventeen men were eliminated because they did not work the required number of days, and 23 lost because of chargeable accidents.

More Records in Chicago

29,576,412 rode Chicago Surface Lines in six days preceding Christmas. 100 per cent operation

W HEN the Chicago Surface Lines attained 100 per cent operation in the Christmas shopping peak of 1926 the feat was recognized as an unusual achievement for a large electric railway system. During the week before Christmas in 1927, however, the company not only duplicated its previous record but succeeded in maintaining 100 per cent operation of all passenger equipment on three days.

On Wednesday, Thursday and Friday, Dec. 21, 22 and 23, every one of the 3,639 passenger cars owned by the company was in service on the streets during the heaviest peak-load periods. On Monday, Dec. 19, all but eight of the cars were in service and on Dec. 20, only one car was laid up for repairs.

and wheels were rushed to the place with a repair crew and at 4:20 p.m.—in one hour and 25 minutes—the car was put back and sent on its way.

In all, there were six cases of heavy damage to cars requiring the repair or replacing of front ends. In each instance repairs were made quickly and the cars returned to service.

Equal efficiency was shown by the employees of other departments. Trainmen were alert to avoid accidents which might disable cars and to make such minor adjustments and repairs as were necessary to keep them running. Emergency crews did splendid work in preventing serious delays.

During the six days preceding Christmas 29,576,412 rode on the system, an increase of 2,663,049 over the corresponding days in 1926. Adverse weather conditions tended to delay Christmas shopping in Chicago and the huge increase in riding during the week



In perfect condition four days after, for Christmas rush

The greatest effort and co-operation by the transportation, shops and equipment, track and emergency departments were required to accomplish this.

New records were made by the shops and equipment department in repairing damaged cars. For instance, car No. 3,095 was struck by a skidding cement truck on Dec. 17 and the entire front vestibule was demolished. The accompanying illustration shows the seriousness of the damage done to this car. It was put into the shops at once and a crew of men started working on it. On Wednesday, Dec. 21, it was returned to service in good condition as the result of 735 hours of labor.

Another instance of quick repair work is reported in the case of car No. 5779. At 2:55 p.m. on Dec. 21 an axle on this car was broken in an accident. Instead of hauling the car to the shops an emergency crew took it off the rails and placed it against the curbing, leaving the tracks clear for traffic. New axle

before Christmas is attributed largely to this fact,

The 100 per cent operation of equipment on three days enabled the system to handle this enormous load with minimum congestion and maximum speed.

Officials estimate that by being able to use all equipment in the Christmas peak they saved the investment necessary for 200 additional cars the number usually going through the shops. The cost for car and car storage would average about \$20,000, making a total saved in capital investment of approximately \$4,000,000.

Use of One-Man Cars Extended in Springfield

The Springfield Street Railway, Springfield, Mass., made a further extension of the one-man car system when its Forest Park line was put on that basis recently.

Improved Service in St. Louis

The St. Louis Public Service Company, St. Louis, Mo., which promised the car riders better service when it took over the street car system on Dec. 1, has already taken several steps toward making good the pledge. As a result of a survey into street car traffic 30 additional cars will be placed in service on the Olive, Hodiamont Southampton and Grand lines. A study of the transportation needs of other divisions is now under way.

A new form of transfer was also put in use at midnight Dec. 31 to facilitate the handling of traffic during rush hours and at all other periods. This transfer differs from the old in that when a double transfer is needed the second conductor simply will tear off a stub instead of issuing a new transfer as formerly. The colors of the new transfer are white and red, as under the old system, but contain the words "down" and "up" on their face. The "down" transfer is used for passengers going downtown and on southbound crosstown cars, while "up" transfers are used for trips away from the downtown district and on northbound cars.

Another innovation which is being tried out by the St. Louis company is a stop light for street cars similar to those used by automobiles. The stop light is now being used on only one car, but if it is sufficiently advantageous similar lights will be installed on all cars.

Appeal Filed in Seattle-Von Herberg Tangle

An appeal from the decision of Circuit Judge Frank S. Dietrich who dismissed the Seattle Municipal Railway litigation in the federal courts has been filed by attorneys for John G. Von Herberg, despite the request of the City Council and numerous business men of the city to Mr. Von Herberg to drop the The suit was instigated against the city to test the legality of the purchase and bond ordinances giving the bondholders prior lien against the gross revenues of the street railway system. Judge Dietrich, sitting as district judge, heard the arguments in the suit brought by Mr. Von Herberg and also the suit brought by the Puget Sound Power & Light Company, involving the railway system, and sustained a motion to dismiss.

Eight Cents Sought in Joplin

The Southwest Missouri Railroad through its receivers F. C. Wallover and H. C. Rogers has applied to the Missouri Public Service Commission for authority to increase the fares in Joplin, Mo., from 5 cents to 8 cents or two tickets for 15 cents. During the past year under a 5-cent fare the deficit was more than \$20,000 it is claimed. Federal Judge Merrill Otis authorized the receivers to ask for a higher fare.

Recent Bus Developments

Bus Operation Planned on Plymouth & Brockton

The Plymouth & Brockton Street Railway, operating a line between these two points in Massachusetts, is planning to abandon service. Parts of the line have been served by buses and it is now the plan to conduct the business in its entirety as a bus proposition. Just as soon as the necessary licenses denanded by bus laws can be secured from the various towns through which the line passes, the change to bus operation will be made.

When the line was built in 1889 it operated a distance of $4\frac{1}{2}$ miles and was known as the Plymouth & Kingston line. Later the name was changed to the Brockton & Plymouth Street Railway and still later became known as the Plymouth & Brockton Street Railway. The line was in financial distress about ten years ago and patrons were called upon to lend their aid.

Bus Permit Denied Olympia Traction Property

The Department of Public Works has denied the application of the Pacific Northwest Traction Company for a certificate to operate motor passenger and express service between Seattle and Everett over the much-coveted new Pacific highway route, and has granted a permit to B. Krakenberger for the service. In refusing the traction company's application, the department said:

The deduction seems warranted that it has operated its bus service, not for the convenience of the public, but for the convenience and protection of its electric railway.

Both electric railway and motor service, the latter over the old Seattle-Everett Highway, are supplied by the traction company. Citing as proof that the applicant discriminated in favor of the railway, the department said that the train fare between Beverly Park and Everett, a distance of 3 miles, was 10 cents, and the stage fare 20 The company immediately appealed from the order of the department and writ of review and supersedes bond order in the sum of \$5,000 were issued by Judge John M. Wilson of the Thurston County Superior Court. The writ is made returnable on Jan. 23.

No Relief for Ohio Commission on Bus Cases

An opinion just handed down by Attorney-General E. C. Turner of Ohio has dealt a blow to the plan to relieve the Public Utilities Commission of Ohio of a vast amount of work in connection with the motor bus franchise and rate

cases. The plan had been to use attornev examiners to handle these cases for the Utilities Commission. The Attorney-General in a ruling to the commission says that no money can be authorized for paying for transcribing records in cases investigated by the attorney examiners. There are two possible cures for this situation. There could be action by the emergency board, or by a special session of the State Legislature. Gov. A. V. Donahey has indicated that for the present, at least, he has no intention of calling a special session. Officials are inclined to believe, however, that the emergency board may act.

Emergency Bus Ordinance Authorized in Portland

An emergency ordinance was granted to the Southern Pacific Company by the City Council of Portland, Ore., to operate certain buses which have been substituted for eleven Red Electric trains, formerly used to serve suburban districts. The new ordinance gives the company permission to operate its buses at the Fourth and Stark Street station in the center of the city and to make stops with these buses for picking up and discharging passengers at any other Southern Pacific station in Portland.

Passenger Traffic Gain on New York Suburban Line

Lower commutation rates, the installation of new trains and the establishment of "feeder" motor coach lines contributed to a 12.6 per cent increase in passenger traffic over the New York, Westchester and Boston during the first six months of 1927, as compared with the period in 1926.

Between Jan. 1 and June 30 this year the railway carried 6,301,045 passengers. This represented a gain of 705,090 or 12.6 per cent over the figures reported for the first half of 1926 and marked a new record business for the road. The greatest percentage of gain, 14.29, was registered in the 60-trip commutation class of traffic.

June also set a new record. In carrying 1,106,807 passengers the railroad not only exceeded the million-a-month quota for 1927, but also exceeded by 81,040, or 7.9 per cent, the June, 1926 figure. During June, however, the greatest percentage of increase, 9.84, was in the single-trip class of riders, indicating the growing popularity of the railroad among intracity travelers.

The squadrons of motor coaches recently put into service by the County Transportation Company, a subsidiary of the New York, Westchester & Boston, to replace, in Connecticut and in various sections of Westchester bordering Long Island Sound, the trolleys of the New York & Stamford Railway, another subsidiary, are proving so popular that additional coaches have been ordered for this "feeder" system.

Motor Transport Division for Steam Railroads

Due to the growth and increasing importance of the bus and truck as an adjunct of railroad transportation, a new division of the American Railway Association, known as the Motor Transport Division has been created. Membership in the division will be confined entirely to representatives of the railroads or subsidiaries in the United States, Canada, Mexico and Cuba. Headquarters of the division will be at the offices of the American Railway Association, 30 Vesey Street, New York, A. P. Russell, Boston, vice-president of the New York, New Haven & Hartford Railroad and Haven & Hartford Railroad president of the New England Transportation Company, which operates the buses of the New Haven system, has been appointed temporary chairman. George M. Campbell, New York, assistant to the secretary of the American Railway Association, will be secretary of the division.

The purpose of the organization is to bring together the railroads interested in the development of motor transportation, whether freight or passenger, in order to study the problems arising therefrom, and through the co-ordination of the rail carriers, to devise the most effective means possible for the development of such transportation.

The work of the Motor Transport Division will be divided into three sections, one to the study of the application of the bus to the use of steam railroads, another to the study of the application of the motor truck to the use of steam railroads, and the third to the application of the rail motor car to the use of steam railroads.

The first meeting of the Motor Transport Division will be held in Chicago in January at which time a permanent organization will be perfected and discussed. Its creation is the outgrowth of the Railroad Motor Transport Conference organized in August, 1926, by approximately 50 railroads, which were at that time interested in the development of buses and trucks.

Pittsburgh Bus Route Extended

The present Point Breeze route of the Pittsburgh Motor Coach Company, subsidiary of the Pittsburgh Railways, Pittsburgh, Pa., was extended Dec. 12, 1927, to Penn and Center Avenues, Wilkinsburg, and is known as "Wilkinsburg." Operation of the present Point Breeze route on Dallas Avenue from Penn Avenue and along Thomas Boulevard will be discontinued. The fare will be 25 cents one way with tickets for convenience on sale by the operator at 21 for \$5.

Financial and Corporate

Huntington Properties Change Hands

City and interurban lines in West Virginia pass from Appalachian Electric Power to Central Public Service Corporation

ELECTRIC railway properties in Huntington, W. Va., and the urban and the interurban lines between Huntington and Ironton, operated by the Ohio Valley Electric Company, have changed hands. That fact was made known on Dec. 30 by W. R. Power, division manager of the Appalachian Electric Power Company. The trackage totals 54 miles. The deal also includes the Ohio Valley Bus Company.

The transfer was effected through a sale of the stock of the Ohio Valley Electric Railway by the Appalachian to the Central Public Service Corporation, Chicago, of which A. E. Pierce is president. He formerly resided in Huntington while he owned and operated the Huntington Development & Gas Com-

panv.

Simultaneous with the Huntington announcement came word that the Chicago corporation had also acquired control of the electric railway systems in Portsmouth, Ohio, and Wildwood, N. J., and the electric company in Rockford, Ill.

Mr. Power was advised of the consummation of the deal in a telegram from George N. Tidd, New York, president of the American Gas & Electric Company, of which the Appalachian Electric Power Company is a subsidiary.

With the sale of its transportation lines, the American company will derive virtually all its gross income in the Huntington section from electric power and light operations. Its electric properties in all cities except Rockford are retained.

It was in 1899 that the historic Consolidated Light & Railway Company, headed by the late J. L. Caldwell, operated the first electric car between Huntington and Guyandotte. This company subsequently built other lines within the city. It remained for the late Johnson N. Camden and his associates to secure control of the various electric railway interests in Huntington, Ashland and Ironton and to link them together in one interurban system under the ownership of the Camden Interstate Railway. Senator Camden completed the last link in his system in 1900.

In 1902 the company was purchased by Colonel John Graham and sometime thereafter the company became the Ohio Valley Electric Railway. Colonel Graham sold the properties in 1907 to W. X. Sproul, afterwards Governor of Pennsylvania, and a group of associates. The Sproul interests sold to the American Railways in 1912.

In the next few years the commercial power business began to loom large and the American Railways became the American Electric Power Company. In 1923 the American Gas & Electric Company became the general holder of large power interests including those in this section now operated by the Appalachian Power Company.

Missouri Utility Stock Sought

The City Utilities Company, St. Louis, Mo., has asked the Missouri Public Service Commission for authority to hold more than 10 per cent of the stock of the St. Louis Public Service Company and of the Kansas City Public Service Company, both of which were reorganized by Newman, Saunders & Company, Inc. A Missouri statute prohibits a foreign corporation from holding more than 10 per cent of the stock of a Missouri public utility without the permission of the state commission. Col. Albert T. Perkins, former general manager of the St. Louis railway system and now vice-president of the City Utilities Company, said the company would hold 40 per cent of the common stock of the St. Louis company and 25 per cent of the Kansas City stock if permitted.

Loss on San Francisco Municipal \$240,228

For year ended June 30, 1927, the system sustained this loss after allowing for the deduction of charges comparable to those a private system would have to meet

TOTAL revenue of the Municipal Railway of San Francisco, San Francisco, Cal., for the year ended June 30, 1926, was \$3,420,074 against \$3,409,965 the year before. Interest on securities owned was \$46,641. A consideration of detailed operating expenses shows an increase in every account except one, leaving the total of \$2,879,905, or \$274,759 greater than in the year 1926.

The report is prepared for and ap-

proved by the finance committee of the Board of Supervisors. For the purpose of securing a comparison between the results of operation of the municipally owned utility and similar utilities operated by private capital the charter of the city and county of San Francisco provides that the operating reports should include certain comparison charges consisting of items which constitute part of the actual cost of operating privately owned companies but

COMPARATIVE INCOME ACCOUNT MUNICIPAL RAILWAY OF SAN FRANCISCO

	Year Ended 1926	June 30 1927	Dec. 28, 1912 to June 30, 1927
Passenger revenue	\$3,395,950 14,015	\$3,398,187 21,887	\$35,477,710 159,373
Total revenue	\$3,409,965 43,467	\$3,420,074 46,641	\$35,637,083 451,378
Total income	\$3,453,432	\$3,466,715	\$36,088,461
Operating expenses: Way and structures. ' Equipment. Power. Conducting transportation. Traffic. General and miscellaneous. Loss on road retired.	\$134,911 200,365 488,812 1,694,704	\$144,876 212,597 488,143 1,843,837 423 190,027	\$1,194,781 2,106,069 4,811,651 16,139,161 4,260 1,525,658 8,184
Total operating expenses	\$2,705,146	\$2,879,905	\$25,789,767
Excess of income over operating expenses	\$748,286 177,133	\$586,810 167,768	\$10,298,694 2,906,542
Excess of income over operating expenses and interest	\$571,153	\$419,041	\$7,392,152
Deduct: Provision for depreciation	\$398,789 106,088	\$247,362 84,954	\$3,917,296 670,984
Total	\$504,877	\$332,316	\$4,588,281
Profit from operations, hefore deduction of comparative charges raquired by charter. Deduct comparative charges as required by charter:	66,275	86,724	2,803,870
Taxes Fira insurance	318,009 4,951	318,271 5,138	3,148,672 67,058
Total	\$322,961	\$323,409	\$3,215,731
Income, after deduction of comparative charges	\$256,685	\$256,684 25,278	\$411,860 62,948
Total Credits to income	\$ 256,685	\$261,962 21,734	\$474,808 161,075
Net income	\$256,685	\$240,228	\$313,733

STATISTICAL DATA MUNICIPAL RAILWAY	of s	AN FRANCISCO	ENDED .	JUNE 30, 1927
		Total Amount	Per Car-Mile	Per Car-Hour
Passenger revenue	<i>.</i>	\$3,398,187.05	0.3604	3,4819
Operating expenses			0.3054	2,9509
Interest on funded debt		167.768.33	0.0178	0.1719
Provision for depreciation		247,362.24	0.0262	0.2535
Provision for accidents.		84,954.69	0.0091	0.0870
Taxes (comparative charge)		318,271.27	0.0337	0.3261
Fire insurance (comparative charge)		5,138.13	0,0005	0.0053
Net loss		240,228.53	0.0255	0.2461
*Passenger car mileage		9,428,522.00		
†Passenger car hours		975,949.00		
Platform expense		1,542,955.35	0.7636	1.5810
No. of passenger cars owned		224		
No. of work cars owned		6		
		230		
Total number cars owned		19		
Total number of buses owned	• • • • •	19		
Total number of cars and buses owned		249		
tRevenue passengers carried			7.2992	70.5163
Free transfer passengers carried.			1.5104	14.5914
Free passengers			0.0576	0.5562
rree passengers,			5,5570	0.5502
Total passengers carried		83,603,652	8.8672	85,6639
* I - ludes has mileage of hases				

* Includes bus mileage of buses.
† Includes bus hours of buses.
† Transfers lifted at Fillmore and Union Streets treated as revenue passengers pending the result of present itigation with the Market Street Railway.

which the municipally owned utility is not required to pay. These charges in 1927 amounted to \$318,271, leaving a net loss of \$240,228 for the year. The deficit in the cumulative account from Dec. 28, 1912, to June 30, 1927, was \$1,885,606.

Items in the balance sheet are listed in detail. Capital assets include road and equipment, \$8,636,839, and general expenditures, \$324,872, and construction work in progress, \$7,422, making the total property investment \$8,969,134. Thus the total assets was \$11,080,168. The items in the halance sheet were condensed for reproduction in the table that appears elsewhere on this page.

Total bus mileage is 11.89. That of the railway was more than 74 miles.

Under the heading cash and securities with treasurer are grouped cash and securities held by the treasurer of the city and county of San Francisco for and on account of the municipal railway.

CHANGE IN PROCEDURE ON ACCIDENT PREVENTION RESERVES

Funded debt unmatured stood at \$3,-295,000. This amount represents the par value of unmatured bonds outstanding at June 30, 1927.

Reserve for accidents stood at \$116,-774, made up as follows:

Accident Reserve Fund: Cash with Treasurer Less: Warrants Payable	
Available Cash	\$21,171 95,603
Total	 ,\$116,774

The accident reserve fund was established by ordinance passed by the Board of Supervisors on April 19, 1926. According to the terms of the ordinance, 2½ per cent of the gross passenger revenue must be set aside for the purpose of paying claims for accidents and damages resulting from the operation of the municipal railway (other than accidents to employees) and expenses incidental thereto such as expenditures of claim and legal departments. During the period under review, the sum of \$84,954

was transferred to this fund to take care of the provision which has just been outlined.

Reserve for accrued depreciation of road and equipment stood at \$3,834,891. This amount represents the accumulated provision for depreciation of road and equipment as prescribed by ordinances, less charges thereto on account of depreciation previously set up on those assets which have been retired. Ordinance No. 3109 N. S. provided that 18 per cent of the gross passenger revenue should be set aside each year to meet all charges on account of depreciation and to pay the principal of the bonded indebtedness incurred in the construction of the railway. This ordinance was made retroactive to Dec. 28. 1912, and its provisions were compiled with until April 30, 1926, when it was repealed by ordinance No. 7060 N.S. Ordinance No. 7060 N.S. provides that 3 per cent of the cost of road and equipment shall be set aside each year to meet all charges arising on account of depreciation of road and equipment. Thus no uniform annual rates of depreciation

based on cost were adopted until April. 1926.

The difference between the balance in this account and the net provision, as disclosed by the table that is contained in the pamphlet report is as follows:

Net provision for depreciation closed by table Less: Provision for depreciation ble to assets retired:	on applica-	\$3,917,2 96
Fiscal Year ended June 30:		
1921	\$2,063,61	
1923	30,650.00	
1924	1.082.50	
1925	4,960.00	
1927	43,649.25	82,405
Balance per books, June 30, 19		

CONDENSED COMPARATIVE GENERAL BALANCE SHEET MUNICIPAL RAILWAY OF SAN FRANCISCO AS OF JUNE 30, 1927

Assets:	1927	1926
Capital assets	\$8,969,134 2,026,605	\$8,570,280 2,115,331
Total assets	\$11,080,168	\$10,839,652
Liabilities, reserves and surplus: Funded debt unmatured Current liabilities Reserves (total unadjusted	\$3,295,000 574,951	\$3,493,000 407,739
oredita) Contributed surplus Net surplus	4,018,724 356,552 3,191,492	3,825,464 356,552 3,113,449
Total liabilities	\$11,080,168	\$10,839,652

STATEMENT OF BUS LINE OPERATIONS MUNICIPAL RAILWAY OF SAN FRANCISCO

Revenues:	Total
Passenger revenue	\$74,408 23,361
Total revenues	\$97,769
Expenses of operation:	
Repairs and painting	\$21,046
Tires, including repairs	12,393
Gasoline and oils	18,384
Cleaning, washing and servicing Conductors and chauffeurs—Salaries and	13,650
wages	51.117
Depreciation of buses	15.786
General and miscellaneous	27,234
Total expenses	\$159,614
Loss from operations	\$61,844 4,020
Net loss for period	\$65,865

ANALYSIS OF ITEMS IN FUND HELD BY CITY TREASURER

Funds Accident reserve. Depreciation reserve. Depreciation. Compensation insurance.	295,939.21 959,421,49	Cash \$29,491.17 a 100,150.08 261,818.16 2,800.24	Securities \$95,603.22 195,789.13 697,603.33
Total	\$1,383,255.33	\$394,259.65	\$988,995.68

ANALYSIS OF ANNUAL PROVISION FOR DEPRECIATION AND PERCENTAGES BASED ON COST

		Provision			
Fiscal Year		For		Cos	st of
Ended		Redemption of	For	Road and	Equipment
June 30	Gross	Bonded Debt	Depreciation	Amount	Percentage
1913	\$24,291	* * * * * * * *	\$24,291	\$1,660,492	1,463
1914	149,672		149,672	4,307,115	3.475
1915	294,959	\$101,000	193,959	5.042.331	3.847
1916	352,075	101.000	251,075	5.396.706	4,652
1917	264.727	101,000	163,727	5,838,791	2.804
1918	425, 271	200,000	225, 271	6,174,607	3.648
1919	430,543	196,000	234,543	6,578,885	3, 565
1920	486,551	196,000	290.551	6.658.817	4.363
1921	516,414	197,000	319,414	6,674,682	4.785
1922	519,266	197,000	322.266	6,802,637	4.737
1923	538,889	200,000	338.889	7.267.837	4,663
1924	571,172	201,000	370,172	7,570,225	4,890
1925	588,308	201,000	387.308	7,992,410	4.846
1926	549,955	151,166	398.789	8, 245, 407	4, 836
1927	247,362	******	247,362	8,245,407	3.000
	5,959,463	\$2,042,166	\$3,917,296		

The charges to the reserve account for property retired, in the sum of \$43,649 were computed on the basis of percentages appearing in the foregoing table, irrespective as to classes of assets. This was occasioned by the fact that a property ledger is not maintained but it is explained that if this record is installed, it should furnish a more equitable distribution of charges on account of property retired.

DISPOSITION OF AMOUNT ORDINARILY SET UP FOR TAXES

The surplus provision for comparable taxation charges stands at \$3,148,672. Chapter 3 of Section 16 of Article XII of the Charter of the city and county of San Francisco provides that the books of account of the municipal railway shall show, in addition to other transactions, estimates of the amount of taxes that would be chargeable against the railway if it were owned by a private corporation. In accordance with the foregoing provision, there has been charged against earnings for the period from Dec. 28, 1912, to June 30, 1927, the following amounts, corresponding to the items that would have been paid if the railway were under private control:

State of California franchise taxes Federal income taxes	\$1,870,453 37,696
City and county of San Francisco fran- chise taxes. City and county of San Francisco car	1,201,721
licenses	38,801
Total	\$3,148,672

Since no liability exists for the comparison charges which are shown in the table above the amount has been considered as a portion of the general surplus of the railway.

The results of operations for the period from Dec. 28, 1912, to June 30, 1927, are disclosed on exhibit B, a summary of which is given in the following table:

Net profit from operations after deduction of all charges except those for taxes provided by the Charter of the city and county of San Francisco,	
which are for comparative purposes only Deduct: Charter comparative taxation	\$2,834,939
charges	3,148,67
Deficit after deduction of charter com- parative charges	\$313,733

The net increase in this account, during the fiscal year under review, in the

sum of \$240,228, is accounted for as follows:

Net profit from operations for the current fiscal year after deduction of all charges except charter comparative	
charges except charter comparative taxation charges Deduct: Charter comparative taxation	\$78,042
Deduct: Charter comparative taxation charges	318,271
Net increase	\$240,228

A reconciliation of the deficit account at June 30, 1926, as between exhibit C of the audit report rendered as of that date and the balance appearing on exhibit A of this report for the same date shown in the accompanying table just as presented in the report.

The net surplus amounts to \$3,191,492 and the increase in this account during the fiscal year, in the sum of \$78,043, represents the net profit for the year after the deduction of all charges except those provided for by the Charter for comparative purposes.

A reconciliation of this account at June 30, 1926, as shown by Exhibit A of the audit report rendered as of that date with the amount shown in Exhibit A of this report for the same date is as follows:

Surplus, June 30, 1926, Exhibit A prior year's audit report		\$5,449,649
Surplus, June 30, 1926, Exhibit A this report		3,113,449
Difference (decrease) Represented by: Portion of reserve for accrued depreciation of road and equipment credited to surplus reducing reserve to an amount corresponding to assets in depreciation funds Reserve for fire insurance credited to surplus Adjustment of demands payable	\$2,273,752 61,920 672	\$2,336,199
Total Less excessive accruals of bond interest payable Net difference	\$2,336,325	\$2,336,199
2100 01101010001111111111111		,,

The certified public accountants who rendered the report say that the records examined by them indicate a satisfactory condition of accounting procedure, personnel and efficiency—a condition, that compares very favorably with that found in organizations of privately owned public utilities and other city and county governments heretofore examined by them.

During the progress of their audit, the accountants who were engaged to make the audit installed, as of July 1,

\$155,166

RECONCILIATION OF THE DEFICIT ACCOUNT

Net loss, June 30, 1926, Ex- bibit C prior year's audit report		\$1, 645,3 7 8
years 1922-1925	\$28,826	
years 1922-1925	7,351	
port deduction fiscal year 1924-1925	820	36,997
Total		\$1,682,376
Deduct items on books not reflected in audit report: Compensation insurance refunds fiscal years 1921–1925		136,832
		\$1,545,544
Deficit per books, June 30, 1926 Add:		*1,545,544
Adjustment of prior year's demands payahle Payments made on account of injuries and damages and charged on the hooks to the reserve for depreci-	\$672	
ation of road and equip-	571.063	572 425
ment	571,963	
Total		\$2,118,179
Deduct: Excess accruals of prior years' bond interest charges	\$125	
Compensation insurance re- funds, etc., prior years Provision for redemption of	2,383	
of funded debt applicable to bonds heretofore ma- tured and redeemed, charged to expense and eredited to reserve for de- preciation of road and equipment	2,042,166	2,044,675
Adjusted deficit account, June 30, 1926		\$73,504
Charges, current fiscal year: Net loss for current year after deduction of com- parative charges, exhibit C	\$236,684	
Uncollectible accounts re- ceivable writtee off	25,033	
Expense of prior years	244	
Total charges	\$261,962	
Credits, current fiscal year: Cancellation of		
prior year's liability \$11.84 Excess in com- pensation in-		
surance reserve, abolished June 30, 1927 21,722.46		
Total credits	21,734	
Net increase in deficit account for year		240,228
Deficit from operations, June		
30, 1927		\$313,733

1927, a modern double entry system of accounts to record all transactions of the municipal railway. In addition they established an accounting procedure which should disclose information necessary for the compilation of monthly reports, as prescribed by Ordinance No. 7060 N.S. of the Board of Supervisors under date of April 19, 1926.

New Directors in Springfield

Three new directors were elected recently to the board of the Springfield Street Railway, Springfield, Mass. They are Frederic M. Jones, president of the Third National Bank & Trust Company; Joshua L. Brooks, president of the Brooks Bank Note Company, and Congressman Henry L. Bowles. The additional directors were elected to increase the local representation on the board. This move increases the number from nine to twelve, eight of whom are Springfield residents.

EXPLANATION OF HOW THE DIFFERENCE BETWEEN THE PROVISION FOR		
THE REDEMPTION OF BONDED DEBT AND THE CASH TRANSFERRED		
TO THE BOND REDEMPTION FUND IS ACCOUNTED FOR		

Provision per TableCash Transferred		\$2,	042,166 887,000
Difference			155,166
Represented by Bond Redemption Paymen	ts made from Operative Fund	d on following I	Bond Issues:
Issue Geary Street, Railway	Date Due	Amount \$95.000	

^{*}Represents provision for five months from Dec. 1, 1925, to April 30, 1926, the date on which ordinance 3109 N.S. was repealed

Legal Notes

Federal Supreme Court—Action of City in Prohibiting Operation of Bus Line on Certain Streets Considered.

The city of Hammond, Ind., passed an ordinance forbidding bus companies from operating over certain routes but permitting certain exceptions. This decision was considered at length in the issue of this paper for Dec. 17, 1927, p. 1129. [The City of Hammond vs. Schappi Bus Line, 48 S.Ct., 67, also a similar case, City of Hammond vs. Farina Bus Line and T. Co., 48 S.Ct. 70.]

Federal Supreme Court—Definition of Common Carrier Given. Such a Carrier Can Be Prevented From Reducing Rates.

The Department of Public Works of the State of Washington established rates for towing, applying to all common carriers, but one tug hoat company charged for its services on a different scale, which was said to be "the same or a little less" than the scheduled rate. It claimed it could establish any rates it wished because it was not a common carrier and that it could not be converted into a common carrier by legislative command. The Supreme Court held, however, that "within settled principles, one who undertakes for hire to transport from place to place the property of others who may choose to employ him is a common carrier," and "a common carrier is such by virtue of his occupation, not by virtue of the responsibilities under which he rests." If the company had not been a common carrier, it could make an arrangement with customers for compensation for its services without regard to the rate established by the Department. [State of Washington ex. rel. Stimson L. Co., vs. Kuykendall et al, 48 S. Ct., 41.]

Iowa—Injury From Sudden Stop of Car to Avoid Accident.

A passenger after paying fare and proceeding to a seat was thrown down and injured by a sudden stop of the car. The stop was to avoid a collision with an automobile which negligently got in the way, so that the motorman could not have foreseen the need for the sudden stop. The company was held not responsible, as a matter of law, for the injury to the falling passenger. [Wheeler vs. Des Moines C.R. Co., 215 N.W., 950.]

Kentucky—Car Discharges Passengers at Unusual Place Because of Defect.

A street railway company was justified in stopping a car at a point beyond the usual stopping place when the motor broke down and asking the passengers to alight, since it is lawful to stop a car

at any place where necessity and convenience may require. One of the passengers after alighting was struck by an automobile about the time she reached the street. The company was not held responsible since it had no control over the driver of the automobile. [Louisville R. Co. vs. Saxton, 298 S.W., 1105.]

New Hampshire — Responsibility of Railway Company for Accident to Ferris Wheel in Park.

A person was injured by the collapse of a Ferris wheel upon which he was The wheel was owned by a concessionaire and was in a street railway park on space leased from a traction company, which owned all of the stock of the street railway operating to the park. The railway had advertised the attractions of the park, including the wheel, on a number of occasions. The court held that while, in most cases, a landlord is not liable to the guests of his tenant for the tenant's negligent maintenance of his leased premises, the situation here was somewhat different because the railway had invited people to patronize the park. This obligated it to use reasonable care to see that the park, including the concessions, was safe for those who had accepted its invitation. The degree of care which it should have exercised was that which was exercised by an average man, rather than that which would have been exercised by a "cautious and prudent man." Hence, an instruction in the trial court that the latter kind of care should have been exercised was held error. [Frear vs. Manchester T. L. & P. Co., 139 A., 86.]

New York—Right of Legislature to Regulate Fares.

Franchises granted by municipal authorities prior to January 1, 1875, when a constitutional article relating to the regulation of fares became effective, are subject to legislative control as to fares, and this control may be exercised through the Public Service Commission. A street rail-way company was formed by the consolidation of eight companies, seven of which received their fran-chises prior to the date mentioned. The eighth railroad did not, but as the city consented in 1892 to the electrification of the consolidated lines under a new contract in which no mention of a five cent fare was made, and as other consents were granted by the city to the consolidated company, the inclusion of this eighth line in the consolidation did not pass the control of fares from the legislature (Public Service Commission) to the city authorities. [Evens et al. vs. P. S. Commission et al., 158 N.E., 310.7

Ohio—Court for Cause Will Reverse Commission's Decision Regarding Cancellation of Transportation Certificate.

A transportation company charged before the Public Utility Commission that a certain bus operator had violated the orders of the Commission in a number of different ways, such as by operating a larger bus than authorized, failing to pay full license fees, having a defective insurance policy, abandoning part of his route without full authority and conducting some express business without being authorized to do so. A hearing was held by the Commission on the petition to revoke the certificate, but it decided that while there were some irregularities in the operation of the line, they were not so glaring as to warrant the revocation of the defendant's certificate of public convenience and necessity. This decision was appealed to the Supreme Court of the State by the transportation company which brought the original charge. After evidence, the court held the violations constituted good grounds for a revocation of the certificate and the order of the Public Utilities Commission was reversed. [Miami Valley T. Corp., vs. P.U. Commission of Ohio, 158 N.E., 591.]

Pennsylvania — Cars Must Control Speed at Crossings. Responsibility of Automobile Guest.

"While trolley cars are not held to the strict rule of control that attaches to a moving automobile at public crossings, they must exercise a certain control to the extent of slackening their speed so as to aid others under stricter control to avoid accidents." An automobile "guest will be held responsible for his action or failure to act in the face of a danger of which he knew, or where it can reasonably be inferred that he must have realized the peril." "Where a guest undertakes to aid in driving a car by observing the condition of the way ahead and surrounding circumstances, he must be held responsible for the result of his own acts." "The guest is responsible for inaction only when he knows of a danger, or where the evidence is such that, from the nature of the situation itself, it appears that he must have realized his peril. He is not required constantly to look out for danger." [Kilpatrick vs. Philadelphia R. T. Co., 138 At.,

Texas — Alleged Negligence of Employee No Defense in Suit Involving Negligence of Employer.

Under the provisions of article 8306, revised statute of 1925, neither contributory negligence nor negligence of a fellow employee constitutes a defense in the case of damages where specific acts of negligence of employer are proved. [El Paso E. Co. vs. Sawyer, 298 S.W., 267.]

Personal Items

R. A. Leussler Resigns at Omaha

Leaves acting service after 25 years, but remains in advisory capacity. More time to Omaha Steel Works

A. LEUSSLER, vice-president and general manager of the Omaha Council Bluffs Street Railway, Omaha, Neb., has retired from active connection with the company other than as a stockholder and director after 25 years' service. He will remain in an advisory capacity for some time. He is interested in the Omaha Steel Works and will devote much of his time to that business. Mr. Leussler issued the following statement:

Managing a railway is always a strenuous job and during the past decade it has been particularly so. For some years I



R. A. Leussler

have wanted to retire from the railway industry entirely but felt it my duty to remain at my post until some pressing problems confronting the company could be solved. With J. N. Shannahan as president, the affairs of the company are now in able hands and I feel the time has arrived when I can, with justice to all interested, retire.

I, therefore, tendered my resignation to take effect at as early a date as convenient and today it was accepted. At Mr. Shannahan's request, however, I have consented to continue in an advisory capacity for

some time.

The 25 years of my service with the company have been full of toil and trials and problems, but they have been pleasant years, too. It has been a privilege to work in close contact with Gurdon W. Wattles and a joy to work shoulder to shoulder with W. A. Smith, whose aims have always been the same as my own, namely, to build solidly and well and to give the people the best car service possible. It has been pleasant, too, to have had always the stanch support of the board of directors.

Now, as to my future plans. I am vicepresident of Omaha Steel Works and have a substantial interest in that company. While I do not wish to tie myself down again with active duties it will now be possible for me to give a little more attention to that interest than was possible before and to have some time for leisure.

Also as a stockholder and director of the railway I will continue to feel a deep interest in the welfare of that company.

President Shannahan said:

I regret Mr. Leussler's decision to retire at this time, but I can quite appreciate the reasons that impel him to this action. He lightens the blow by his generous willingness to act in an advisory capacity for some time to come. His years of service with this company have given him an understanding of its problems that make his advice of the greatest value to me and I am deeply appreciative of the generosity of his offer to help me.

Mr. Leussler acquitted himself well in Omaha under most adverse circum-Under adverse conditions stances. the system there has been affording, on the whole, an adequate and satisfactory service to its patrons. As one of the local papers put it, Omaha people who are familiar with railway service in other cities are aware that their own city has little to apologize for, and much upon which to congratulate itself, in this respect. The difficulties are rather with respect to the company's financial condition, due to an expiring franchise and to maturing bonded obligations that can be met only by extensions or refunding. As the Omaha Bee expressed it:

Mr. Leussler came to Omaha at a time when the local company was expanding. It was taking over the lines in Council Bluffs and becoming, in effect, an interstate carrier. Also, it was planning certain interurban extensions. He was then secretary of the company, more particularly concerned with its accounts than its operation. Changed conditions eventually thrust him into the active and responsible management of the concern, where he found himself confronted with problems that might perplex anyone.

To keep his line in first-class condition, with patronage sadly diminished, and to meet its financial obligations was the big job this man had to wrestle with. Whatever else Mr. Leussler has done, he has kept the service at a high standard. Mr. Leussler may retire from a difficult situation, conscious of having done his work well. It is good to know that he has other interests in Omaha that will keep him here as a member of the community.

Mr. Leussler joined the company at the time of the consolidation of the Omaha Street Railway, the Metropolitan Cable Railway and the Omaha & Council Bluffs Street Railway & Bridge Company. He served as secretary of the company for five years. Then for five years he acted as assistant general manager. In October, 1919, he was made manager to succeed W. A. Smith.

He entered the electric railway business in 1897 as an employee of the People's Railway, St. Louis, Mo. He left that company to become connected with the St. Louis Transit Company, the operating company of the United Railways, St. Louis. He resigned from the company in St. Louis in 1902 to join the Omaha & Council Bluffs Street Railway.

"Narrow-Gage" Line in Hands of George W. Wells

To George W. Wells will fall the romantic if arduous rôle of handling an important "narrow-gage" railroad soon to be electrified. As vice-president and manager of the Boston, Revere Beach & Lynn Railroad he will have a busy program planning de luxe equipment for the suburbanites, remodeling stations and effecting numerous other improvements included in the prospectus of Hemphill & Wells, an engineering and management organization of New York City, which recently purchased the Massachusetts property.

George Wells has been affiliated with his brother, Gardner Wells, and Albert W. Hemphill in the operation of the Interstate Street Railway, Attleboro, Mass., of which he was local manager until his firm took over the Poughkeepsie & Wappingers Falls Railway property about a year ago. The past year, however, he has divided his time between these two utilities. During the



G. W. Wells

war George Wells was connected with the Transportation Department of the United States Housing Corporation in charge of the work in the East. After the war he spent about two years with the American Electric Railway Association as director of exhibits.

His experience and training should fit this railway promoter to fulfill the hopes of the folk of that district who for more than half a century have enjoyed the convenience and advantage of the "narrow-gage," which grew from humble beginnings to a utility owning 26 locomotives and four big modern ferry boats. He received his early training in the General Electric Company, serving first in the construction end and later in the commercial department. For a number of years he was associated with the West Penn Railways at Connellsville, Pa., and spent about five years with Stone & Webster as manager of the Tampa Electric Company.

The combination of Gardner F. Wells as president and George W. Wells as vice-president and general manager portends fast and attractive service and a continuation of the dividend-paying habit, never broken on this utility.

George Frey Now Brill General Sales Manager

George Frey, who has been assistant general sales manager of the J. G. Brill Company for the past two years, was promoted to general sales manager on Jan. 1. He will continue to supervise the Brill sales organization, which he has done since his appointment as assistant general sales manager, announced in the Electric Railway Journal, issue of Nov. 7, 1925.

Mr. Frey's affiliation with the Brill organization dates back to July 28, 1914, when he started in the estimating and labor departments. Ten years prior to that he had entered the electric railway field, when, at the age of fifteen years, he got a job in the armature repair shop of the Cincinnati Traction Company. This was the beginning of an experience and training in both the operating and manufacturing ends of the business which has resulted in a broader knowledge of the industry's problems and a better understanding of their solution. His experience includes practical shop work, details of development and design, estimating, service as an executive assistant and selling.

After successively serving in various capacities with marked distinction Mr. Frey was placed in charge of the Brill Southern sales division in October, 1919. Due to his wide practical engineering experience, combined with a forceful and pleasing personality, he was particularly successful in this capacity and obtained results which were responsible for his promotion to the leadership of the Brill sales organization.

John J. Esch Gets Recess Appointment

As a result of the Senate's failure to act upon his renomination, John J. Esch of Wisconsin, chairman of the Interstate Commerce Commission during 1927, automatically went out of office on Dec. 31, but on Jan. 3 President Coolidge reappointed him to act during the recess of Congress over the holidays and until that body can pass upon him.

Mr. Esch, who as a member of the House of Representatives was co-author of the transportation act, was reappointed recently by President Coolidge on the expiration of his first term as a commissioner. The Senate Interstate Commerce Committee, on motion of Senator Wheeler, Democrat, of Montana, postponed a vote on the confirmation, however, and Congress recessed for the holidays.

The chairmanship of the commission under its rules passes to another member with the new year, and Commissioner J. B. Campbell of Washington has been designated for the post

by his associates.

The commission is threatened with another vacancy in its membership. Henry Hall of Colorado for some weeks has had in President Coolidge's hands a resignation intended to take

effect whenever the President was ready to name a successor.

Among those mentioned for the place are Victor E. Wilson, former member of the Nebraska State Railroad Commission; Claude Porter of Des Moines, a former member of Congress, and P. J. Farrell, now solicitor of the commission.

C. E. Myers and G. T. Atkinson in Philadelphia

Aids were recently announced by Mayor Mackey of Philadelphia, Pa., for the administration of city affairs during the next four years. Clarence E. Myers was chosen director of the Department of City Transit and George T. Atkinson assistant director.

Mr. Myers was connected with the Pennsylvania State Highway Department in various engineering capacities from 1911 to 1921. Prior to 1911 he was affiliated with electric railways in During the western Pennsylvania. war he was a captain and later a major of engineers in America and France. Since 1921 he has been construction engineer and deputy chief of the Bureau of Highways. Early in his career Mr. Myers was an instructor in civil engineering and military science at the Pennsylvania Military College, from which institution he was graduated in 1909 as a civil engineer, and returning for post-graduate work years later received the degree of master of civil engineering in 1926. Mr. Myers was

born in McKeesport 40 years ago. His assistant, George T. Atkinson, is reognized as an authority on transit affairs. In 1888 Mr. Atkinson entered the steam railway service and had eight years' experience in construction and operation with the Louisville & Nashville Railroad. From 1897 to 1909 he was engaged in electric railway construction, operation, management and accounting. Later he became a member of the staff of Ford, Bacon & Davis, consulting engineers, making investigations and reporting on contemplated electric railway systems in various cities throughout the country. His work included the traffic survey and recommended system of rapid transit development published in the report of the Transit Commissioner of Philadel-phia under date of July, 1913. He was appointed assistant director of the Department of City Transit in 1915. Mr. Atkinson was born at Carrollton, Ohio, in 1871.

Changes in Minnesota Commission Staff

Frank W. Matson, junior member of the Minnesota Railroad and Warehouse Commission, will succeed Ivan Bowen, retiring member, in the railway, bus and truck division.

C. J. Laurisch of Mankato, the new member, takes up Mr. Matson's former work relating to grade crossings and other activities.

J. C. Guild, Jr., Succeeds the Late B. C. Edgar

Jo Conn Guild, Jr., has been appointed general manager of the Tennessee Electric Power Company, Chattanooga, Tenn., succeeding the late B. C. Edgat. In addition he is vice-president of the company. Mr. Guild is a son of the late Jo Guild, widely known throughout the South in the engineering field and a pioneer in power development in that section.

James C. Bennett, comptroller and secretary of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has been elected vice-president to have charge of the accounting and treasury departments. The oldest Westinghouse employee began service with that concern in 1886, five months after its formation. His first position was assistant to the auditor, and for some time he was the only assistant the auditor had. Later he was elected auditor. In 1909 the office of comptroller was created for him and a few years later he became secretary. He is a director of the parent company and several subsidiaries.

OBITUARY

Samuel Lewis Shank

The death in 1927 of Samuel Lewis Shank, twice Mayor of Indianapolis, Ind., removes a picturesque and active opponent the state has had to the Indiana Public Service Commission and the regulatory system of public utility control. Always pronounced in his yiews against state control of utilities, he attracted attention to himself when, as Mayor, he headed a big parade to the State House and demanded the Governor discharge the members of the commission. In a truck heading the parade was a monster signed petition. The Governor paid no attention to the demand. Without the backing of any organization and relying on his own personality, he ran second for Governor among three or four candidates.

G. Dana Emerson, who died in 1927, was former subway engineer for the city of Boston, Mass. He left Boston about nine years ago. He was engaged by the Boston Transit Commission, the predecessor of the present Boston Transit Board, under Chief Engineer Howard A. Carson, to work on subway plans. He was an associate of Edmund Davis, an assistant to Mr. The commission was then Carson. planning the Boylston Street subway, the Fort Point Channel and Cambridge tunnel suhways. He served on the Transit Commission eighteen years and took an important part in the engineering plans in connection with the building of the Washington Street tunnel as well as the Cambridge and Boylston Street tunnels.

Manufactures and the Markets

\$10,000,000 Expansion in Texas Utility Companies

The Texas group of public utility companies under Stone & Webster management, namely, the operating subsidiaries of Eastern Texas Electric Company (Delaware), El Paso Electric Company, Galveston-Houston Electric Company and Northern Texas Electric Company, have arranged for spending approximately \$10,000,000 in the next year on improvements and general expansion. A considerable portion of this amount will be used on the railway systems in Fort Worth, El Paso, Galveston and Houston. The Houston transportation system has already invested \$340,000 in twenty new cars, and

among other expenditures will use about \$175,000 to purchase fifteen new buses to establish express bus service from Houston to Harrisburg. It is expected that this service will be started within the next few weeks.

About \$3,000,000 of the \$10,000,000 appropriation will be spent for construction of power facilities at the Neches station near Beaumont, Tex. Here the Gulf States Utilities Company, a subsidiary of the Eastern Texas Electric Company (Delaware), is constructing an additional unit of 47,000 hp. capacity. The first unit, with a capacity of 40,000 hp., was installed only a little more than a year ago, but the rapid increase in the demand for electricity in the territory served, which is sup-

plied through a network of high-tension transmission lines extending more than 200 miles along the Gulf Coast, so the managements feel, warrants the construction of this second unit, which will more than double the present generating capacity of the Neches power station.

Interborough Not Infringing Car Door Patent

A suit for infringement of patent 1379583, brought by S. P. Walkup against the Interborough Rapid Transit Company, was decided in favor of the defendant in the Circuit Court of Appeals, Second Circuit. The case had been appealed from the District Court of the Seventh District of New York.

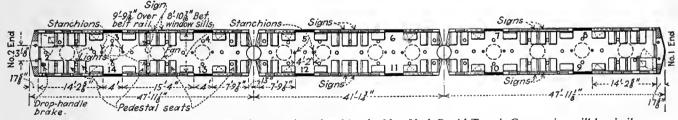
The decision says that the claims in the original patent indicate the inventor expected that the door control system would be actuated from contacts made at the station and from power from a

Details of Fifty Triplex Car Units for New York Rapid Transit





The new triplex cars of the New York Rapid Transit Corporation will be similar to those built on a previous order, which are shown in the illustrations. The view at the left was taken in one of the end sections of the unit looking from the connecting drum



The seating plan of the 50 triplex car units recently ordered by the New York Rapid Transit Corporation will be similar to the above plan of one of the 67 previously ordered

Specifications have recently been released for the 50 triplex car units—equal to 150 single cars—which were ordered Nov. 19 from the Pressed Steel Car Company by the New York Rapid Transit Corporation. Mention of the order for these car units being placed by the Brooklyn-Manhattan Transit Corporation, the controlling company, was noted in the JOURNAL for Nov. 26. The cars will have an over-all length of 137 ft., a total weight of 207,190 lb. and a seating capacity for 160 passengers. They are of all-steel construction. Subjoined are the specifications as released:

Number of upits
Type of unit. Articulated, motor, passenger, city
Number of seats
Number of seats
Builder of ear body Pressed Steel Car Co.,
Pittsburgh, Pa.
Pittsburgh, Pa.
Total weight
Length over all
Length over body posts
Truck wheelbase
Height, rail to trolley base
Body
Body
plain
Armature bearings
Axles51x9 quenched and tempered carbon steel
Car signal system Faraday buzzers
Compressors Westinghouse D-3-F
ConduitSheraduet, metal
ControlGeneral Electric type PC 15-B
Control.,,,,,,,,,General infective type 10 19 19
Couplers Westinghouse 11-2-A
Destination signs
Door mechanism
DoorsMorton Manufacturing, sliding
Energy-saving devicePower-on time recorder

Finish (paint)	
Roof material	
Seats	
Step treads	

battery or other source of power outside the train. This idea was held not to include the system used by defendant in which the train circuit is used in the door control system.

Harvey Hubbell, Jr., Heads Company His Father Founded

Harvey Hubbell, Jr., was elected president and treasurer of Harvey Hubbell, Inc., Bridgeport, Conn., at a meeting of the board of directors held Dec. 27, 1927. He succeeds his father, the late Harvey Hubbell, whose death was mentioned in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 24. Harvey Hubbell, Jr., was associated with his father in the management of the business. No changes in the established policies of the company are contemplated.

Rehabilitation Program in Worcester Shows Results

The Worcester Consolidated Street Railway, Worcester, Mass., will not authorize a dividend this year, but officials are confident of the future. The 1927 report, which will soon be complete, will, it is believed, show a loss in gross revenue, but this will probably be offset by the reduced operating costs.

More than \$1,250,000 has been spent in Worcester during the year, in the re-habilitation of the road as promised to the city when it consented to permit the New York, New Haven & Hartford Railroad to resume control of the franchise. The major promise was the purchase of 50 new cars. These are now in service. A new carhouse and a garage have been built at the Grove Street plant and are now in use. In addition tracks in many parts of the city have been relocated, others replaced and roadbeds have been improved.

It is said that the substitution of bus service for trolleys in many places in Worcester County by the Consolidated has reduced operating costs. Railway service to Fitchburg, Southbridge, Springfield, Webster, the Blackstone Valley, Marlboro, Clinton and Leominster has been discontinued and replaced with bus service. In the city of Worcester bus lines have been instituted on the Edgemere and Tatnuck-Dawson road routes and the company is committing itself to an extensive bus system.

The accomplishment in roadbed improvement and similar work has been most impressive. Howard R. Whitney, president of the company, said:

While the return on our investment in Worcester is not at present seen, there is every indication that we will realize on it in 1928. It should be remembered that we spent this large sum of money this year and it would be impossible to produce definite evidence of a return. However, our most recent reports indicate that our railway passenger husiness is increasing, due to some extent to our new rolling stock.

The new plan of bus service is proving

satisfactory. The bus business, of course, during the summer months was bad because so many people used their private automobiles. During the winter bus service increases steadily. I believe that we will show a profit for our bus for the year despite our expenditures for a new garage and new equipment.

There are 230 closed cars on the 114 miles of track operated by the company in Worcester in addition to 50 open cars. To supplement the railway service there are 52 motor coaches.

Will Award \$100 for Best Leather Slogan

The executive committee of American Leather Producers, Inc., has authorized an award of \$100 to the individual, irrespective of his business affiliations, who will submit, prior to Jan. 15, 1928, a slogan that in the opinion of the committee is of sufficient merit to be used by the leather industry as a whole. Desirable qualities in the slogan wanted are forcefulness, brevity and simplicity. It must also be comprehensive, to include all types of leather.

Prices Stiffen on Copper; Lead and Zinc Steady

Markets for the non-terrous metals have been very quiet during the week ended Jan. 4. Copper, however, has shown quotational strength and is virtually established at 14.125 cents delivered. Lead is unchanged in New York and slightly firmer in St. Louis, whereas zinc is, if anything, a shade

METAL, COAL AND MATERIAL PRICES
F. O. B. REFINERY

Metals—New York

Jan. 3, 1928

	, - -
Copper, electrolytic, cents per lb. Copper wire, cents per lb. Lead, centa per lb. Zinc, centa per lb. Tin, Straits, cents per lb.	13 862 5-16.00 6 50 5.987 57.75
Ultuminous Coal, f.o.b. Mines	
Smokeless mine rnn, f.o.b. vessel, Hampton Roads, gross tons. Somerset mine rnn, Boston, net tons. Pittsburgh mine run, Pittsburgh, net tons. Franklin, Ilt., screenings, Chicago, net tons Central, Ill., screenings, Chicago, net tons. Kansas screeninga. Kansas Citv. net tons.	1.55 1.50 2.175
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft Weatherproof wire base, N.Y., cents per lb. Cement, Chicago nat prices, without hage Linsaed oil (5-bbl. lots), N. Y., cents per lb White fead in oil (100-lb. keg), N. Y., cents par lb Turpentine (bbl. lots), N. Y., per gat	5.50 16.50 2.05 10.6 13.25 0.65

weaker. Tin prices are off a fraction of a cent in the domestic market.

During the week copper has sold at prices ranging from 14 cents to 14.125 cents, Connecticut Valley basis, though but one small sale at 14 cents has been made since Dec. 31. Since then the bulk of the metal has brought 14.125 cents. A big tonnage brought 14.25 cents for delivery in the Middle West Jan. 4. Copper Exporters, Inc., have maintained their price at 14.50 cents c.i.f. The f.a.s. market has been good at 14.25 cents.

The New York price for lead continues unchanged at $6\frac{1}{2}$ cents, the contract price of the American Smelting & Refining Company. In the Middle West there is a slight disposition to quote higher prices than 6.30 cents, St. Louis.

Zinc prices have ranged from 5.625 cents to 5.675 cents, the higher figure covering metal for forward delivery.

Forward tin has ruled about oneeighth cent less than prompt. Prices on the 99 per cent grade have recently been only nominal:

SHOPS AND BUILDINGS

Philadelphia Rapid Transit Company, it is reported, will shortly build in the neighborhood of Front Street and Green Lane, a new shop and maintenance building at an approximate cost of \$2,000,000.

TRADE NOTES

Ohio Brass Company, Mansfield, Ohio, announces the opening of an office at 721 Healy Building, Atlanta, Ga. H. W. Kilkenny, representative of the company for the past four years with sales headquarters in the Pittsburgh district, has transferred his activities for his company to the St. Louis district. S. W. Walworth succeeds him in the Pittsburgh territory.

WHITE MOTOR COMPANY, through its president, Walter C. White, has announced the promotion of George W. Smith, Jr., formerly technical assistant to the vice-president and general manager of the company, to the position of works manager. Mr. Smith succeeds R. M. Hidey, resigned.

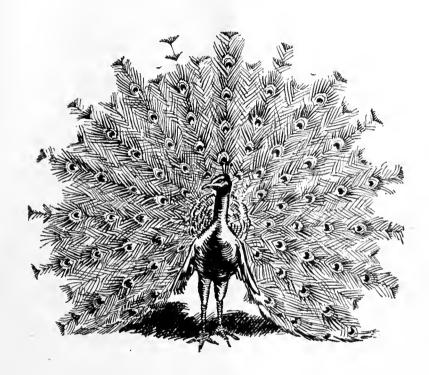
R. C. Jenkins has joined the forces of the Shuler Axle Company at Louisville, Ky., in the capacity of special representative.

Rollway Bearing Company, Inc., Syracuse, N. Y., recently announced that it had opened a sales office at 614 Empire Building, Pittsburgh, Pa. Samuel Farrell, who has been affiliated with the Rollway Bearing Company, Inc., for a number of years, with headquarters at Youngstown, Ohio, is in charge of the above office.

ADVERTISING LITERATURE

CROUSE-HINDS COMPANY, Syracuse, N. Y., has issued a folder containing suggestions for floodlighting. Seventeen illustrations increase attractiveness of the folder.

Ohio Brass Company, Mansfield, Ohio, has issued a folder describing its OB splicers. Various types of splicers are shown in the illustrations. The number of the folder is 150-B.



When you triple capacity you triple results



THE hand brake with three times the capacity of the ordinary type assures three times the protection to your rolling stock and your patrons. Peacock Staffless Brakes have that excess power. The motorman's effort is most rapidly converted into a dead stop. They cannot be put out of commission by an excess of slack chain. Their simple, rugged construction reduces the maintenance cost to the vanishing point. Write for details.

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative Lyman Tube & Supply Company, Limited, Montreal, Canada JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



101 YEARS OF MANUFACTURING EXPERIENCE



No. 327-M

Snow sweeper rattan and cane webbing may be ordered through any H-W sales office.

FOR INTERURBAN NEEDS

THIS Heywood-Wakefield seat is designed for the modern type of interurban service where comfort is now so important. It has been selected for both new cars and for replacement use.

It has deep, double spring cushions shaped to allow more leg freedom. Mechanism rails are set in. The individual backs are properly pitched for comfort.

Our car seating experts will be glad to help you decide on the best seating equipment for your needs. This service is free through any H-W sales office.

If you have not received a copy of our new Bus Seat Catalogue, write for it.



Heywood-Wakefield Co., Wakefield, Mass.; 516 West 34th St., New York, N. Y.; 439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San Francisco, Cal. The G. F. Cotter Supply Co., Houston, Texas. F. N. Grigg, 630 Louisiana Ave., Washington, D. C. The Railway & Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal;

Winnipeg, Canada.



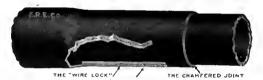
Bethlehem Products for Electric Railways

Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Frogs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Basa Plates; Rolled Steel Wheels and Forged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Least Maintenance

Lightest Weight Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO. CINCINNATI, OHIO

New York City, 30 Church Street

SPECIAL TRACKWORK of the famous TISCO MANGANESE STEEL

WM. WHARTON JR. & CO., INC. EASTON, PA.

Sales Offices:

El Paso Montreal New York Philadelphia Pittshurgh San Francisco Scranton

National Railway Appliance Co. Graybar Building, 420 Lexington Avo., New York

BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass. Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Geara and Pinlons Anglo-Amarican Varoish Co., Varnishes, Enamels, stc.
National Hand Holds Genesco Paint Oils Dunham Hopper Door Device Garland Ventilators Walter Tractor Snow Plows Feasible Drop Brake Staffs Ft. Pitt Spring & Mig. Co., Springs

Fiaxlinum Insulation Economy Electric Devices Co. Power Saving and Inspection Metera Metera
National Safety Devices Company's Whistle Blowers,
Gong Ringers and Brake
Hangers
Godward Gas Generators

Cowdry Automotive Brake Testing Machina

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa. Sales Offices:

Chicago Philedslphia

Cleveland Pittshurgh Dalles

Pacific Coost Representative:
United States Steel Products Compan
Portland San Francisco

Export Representative:
United States Steel Products Company, New

and the grant and the committee of the c

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we appreciate your inquiries.



THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.





Type R-11 Double Register

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittinge, conductors' punches.

The International Register Co. 15 South Throop Street, Chicago, Illinois

PANTASOTE

-the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

-the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

> Standard for electric railway cars and motor buses



Samples and full information gladly furnished.



The PANTASOTE COMPANY, Inc. NEW YORK 250 Park Avenue,



JOHNSON FARE COLLECTING **SYSTEMS**

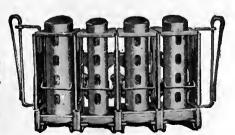


Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 11 to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.





Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.

Nuttall

and Timken!



Nuttall US 20A Trolley Base Equipped with Timken Tapered Roller Bearings

Two old-time names in which the public has a lot of confidence. Both companies make products in which the public has had a lot of confidence for a long time. Just try to imagine how many people are riding on Timken Bearings and under Nuttall Trolleys right today.

The Nuttall US 20A trolley base is equipped with Timken Swivel Bearings-and that settles the bearing question—the friction question.

It is also equipped with a system that settles the lubrication question-fill the reservoir about twice a year, and forget it.

It is equipped with 1000 Ampere Capacity Shunts and that settles the arcing question.

Now Nuttall settles another question—the price question.

Send for Bulletin No. 46

R.D.NUTTALL COMPANY PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. Dis'rict Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co.. Ltd., Montreal and Toronto.



Bankers @ Engineers

Ford, Bacon & Pavis

Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White **Engineering Corporation**

Engineers-Constructors

Oil Refineries and Pipe Lines, Stesm and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

Design and Construction Examinations Reports Appraisals Industrial and Public Service Properties

NEW YORK

BOSTON

CHICAGO

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys Better Service—Financial Reports Appraisals—Management

52 Vanderbilt Ave.

New York

SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design Examinations

Construction Reports

Management Valuations

CHICAGO

NEW YORK

SAN FRANCISCO

Byllesby Engineering & Management Corporation

231 S. La Salle Street, Chicago

New York

San Francisco

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

ENGELHARDT W. HOLST

Consulting Engineers

Appraisals Reports Retes Service Investigation Studies on Financial and Physical Rehabilitation Reorganization Operation Management

683 Atlantic Ave., BOSTON, MASS.

A. L. DRUM & COMPANY

Consulting and Constructing Engineers VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF
ELECTRIC RAILWAYS

230 South Clark Street, Chicago, Ill.

DAY & ZIMMERMANN, INC.

ENGINEERS

Design - Construction - Reports VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS

120 BROADWAY, NEW YORK

YOUNGSTOWN, O. CHICAGO, ILL.

FINANCING MANAGEMENT

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass—Differential Fares—Ride Selling Holbrook Hall 5-W-3

160 Gramatan Ave., Mt. Vernon, N. Y.

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells Albert W. Hemphill APPRAISALS

INVESTIGATIONS COVERING ion Management Operation 43 Cedar Street, New York City

Construction Reorganization

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W. Washington Street, Chicago, Ill.

E. H. FAILE & CO.

Designers of

Garages— Service Buildings—Terminals

441 LEXINGTON AVE

NEW YORK

MCCLELLAN & JUNKERSFELD

Incorporated ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations
Transportation Problems—Power Developments

68 Trinity Place, New York Chicago

St Louis

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES
ATLANTA, Candler Building
Boston, 80 Federal Street
CHICAGO, Marquette Building
CINCINNATI, Traction Building
CLEVELAND, Guardian Building
DALIAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street



WORKS Bayonne, N. J. Barberton, Ohio Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE, Falling Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building SALT LAKE CITY, KEARINS DUBLING SAN FRANCISCO, Sheldon Building SEATTLE, L. C. Smith Building HONOLULU, T. H., Castle & Cooke Building HAVANA, CUBA, Calle de Agular 104 SAN JUAN, PORTO RICO, Royal Bank Building

C. B. BUCHANAN

W. H. PRICE, JR. Ser'y-Treas.

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction Financial Reports, Traffic Surveys and Equipment Maintenance

BALTIMORE 1004 Citizens National Bank Bldg.

Phone: Hanover: 2142

. Trecommunications of the contraction of the contr

NEW YORK 49 Wall Street HIIIIIIIIIIIII

Car Heating and Ventilating

—are to longer operating problems. We can show you how to take sare of both with one equipment. The Peter Smith Forced Ventilstion Hot Air Heater will save, in addition, 40% to 60% of the cest of any other car besting and vacitiating system. Write for details.

The Peter Smith Heater Company 6209 Hamilton Ave., Detroit, Mich.

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK

Street Railway Inspection DETECTIVES

131 State St. BOSTON



Better Quality Seats For Cars and Buses

Hale-Kilburn Co. 1800 Lehigh Ave., Philadelphia, Pa

ILLINOIS MOTIVE EQUIPMENT COMPANY

J. D. Elsom, President

General Sales Agent—The Air Rectifier
District Representatives
Johnson Fare Box; McCloskey Bomb Shell Torch;
Cinch Vertical Swipe; Fyr-Fly Spot Light

35 E. Wacker Drive

Chicago, Illinois

When writing the advertiser for informsilon or prices, a mention of the Electric Raliway Journal would be appreciated.



RAIL JOINTS

DYNAMOTORS WELDING ROD

UNA Welding & Bonding Co. Cleveland, Ohio



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc. 101 Park Avenue, New York City



amanaminani

"Bates Poles Outlive the Bond Issues that Buy Them"

BATES POLES AND STRUCTURES



General Offices and Plants EAST CHICAGO, INDIANA, U. S. A. .



THE WORLD'S STANDARD

"IRVINGTON"

Black Varnished Cambric, Varnished Silk,

Yellow Varnished Paper

Irv-O-Slot Insulation Flexible Varnished Tubing Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co. Irvington, N. J.

Sales Representatives:

Mitchell-Rand Mfg. Co., N. Y.
E. M., Wolcott. Rochester
I. W. Levine. Montreal
A. L. Gillies. Toronto
Concumers' Rubber Co., Cleveland

Prehler Brothers Inc., Chicago White Supply Co., St. Louis Clapp & LaMoree, Los Angeles Martin Woodard, Seattle



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

The Universal Lubricating Co. Cleveland, Ohio Chicago Representatives: Jameson-Ross Company, Straus Bldg.

SEARCHLIGHT SECTION

USED EQUIPMENT @ NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED-RATE PER WORD:

Positions Wonted, 4 cents a word, minimum i. 15 cents an insertion, psyable in advance.

Positions Vacout and all other classifications, 8 cents a word, minimum charge 32.00. Proposals, 40 cents s line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads. Discount of 10% if one payment is made in advance for tour consecutive insertions of undisplayed ads (not including proposals).

POSITIONS WANTED

EXECUTIVE — Fifteen years' experience managing light, power and transportation properties. Open for other connections; personal reasons for desiring change. PW-69, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

GENERAL superintendent or manager; fif-teen years' successful experience. PW-55, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT equipment, M. M. efficiency; work unit cost production appointment wanted; highest personal references; 25 years' experience steam electric, stores; wide bus experience in London and U. S. A. and public relations; willing to go anywhere. PW-70, Electric Railway Journal, Tenth Ave. at 36th St., New York.

TO HELP YOU

LOCATE COMPETENT MEN

"Searchlight" Advertising

WANTED

Experienced Public Utility Executive

for Company with gross revenue of \$5,800,000.00, operating electric utility with two Hydro-electric plants and one steam plant, gas utility and street railway utility, each utility being in charge of a Manager who will report to him. Property is located in growing city of 250,000 population. Position offers an excellent opportunity to right man. Apply stating experience and salary expected, to

P-74, Electric Railway Journal Tenth Ave. at 36th St., New York City

New 29-Passenger

with Birney Bodies built by

AMERICAN CAR COMPANY

Unusually low price Very attractive terms

Quick delivery

Complete information, photographs, specifications, prices and terms furnished upon request to

> THE J. G. BRILL COMPANY Philadelphia

or to any Brill plant.

CURTAIN SUPPLY CO.

Moving to larger office, same building, will sublet present office, 583 square feet, including private office, all overlooking Hudson River.

Apply Room 2074 50 Church St., Hudson Terminal Bldg., New York City

FOR SALE

13,000 kw. Used Rotary Converters

8—1500 kw.—25 cycles
2—500 kw.—25 cycles
with Transformers—Switch Boards, etc.
rice: \$5.00 per kw.. in place, Cincinnati, Price: \$5.00 per kw...
Ohio
For further information address

The Cincinnati Street Railway Company Cincinnati, Ohio

FOR SALE

Three Birney Safety One Man Cars, Clucinnati built, Agasote Ceiling, fine condition. Practically re-built each year.

Also one McGuire Cunmings Snow Sweeper, long brush type, good as new.

SUSQUEITANNA TRACTION COMPANY Lock Haven, Pa

FOR SALE

Following Peter Smith Heaters in good operating condition:
35—No. 2 Smith Heaters.
16—Type "A" Smith Heaters.
6—Type "C" Smith Heaters.
1—Type "CC-2" Smith Heaters.

The Milwaukee Electric Ry. & Lt. Co., Public Service Building, Milwaukee, Wisc.

WANTED 20-K 35 G. or H.H. Controllers

W-75. Electric Railway Journal Tenth Ave. at 36th St., New York City

Don't Say, "It isn't worth anything"

HAT surplus Used Equipment you have lying around the shop or yard can be turned into cash! The fact that it is of no further value to you doesn't mean it isn't of value to somebody else. There's always a market for used equipment. Reach the greatest number of prospective buyers for the surplus equipment you have, at a minimum cost, thru an advertisement in the-

SEARCHLIGHT SECTION



While they last

BIRNEY CARS

Deferred payment plan—Pay out of earnings. Will exchange for your old equipment

Extra Motors, Trucks, Compressors, Controllers, etc.

Transit Equipment Company

Cars—Motors

501 Fifth Avenue, New York



FOR SALE

15 BIRNEY SAFETY CARS

Brill Buill

West, 508 or G. E. 264 Motors
Cars Complete—Low Price—Fine Candition
ELECTRIC EQUIPMENT CO.
Commonwealth Bidg., Philadelphia, Pa.

FOR SALE

10-G.E. 247-A Motors. 6-K. 28-B Controllers.

20-K. 6 Controllers. 10-Westinghouse 68 and 68-C Motors.

J. W. GERKE, 303 5th Ave., N. Y. C.

.....................................

We buy entire Railways and Power Plants H. E. SALZBERG COMPANY, Inc. We sell Street Railway and Power equipment

If there is anything you want—

or something you don't want that other readers of this paper can supply—or use—advertise in the



Somebody is always looking for something to meet certain business needs. Some men in charge of plant operations may be in the market for good used equipment—others may have just what they want, to sell. Some may require a man of unusual qualifications for a particular position—that man may be another reader of this paper! Put the Searchlight Section to work for you under any of the following classifications—to fill your business needs.

Agencies Wanted Agenle Wanted Auction Nolices Buildings For Sale Business Opportunities Civil Service Opportunities Contracts To Be Let

Contracts Wanted Educational Courses Employment Agencies Exchanges For Rent Items Franchises Industrial Siles

Miscellaneous Wants New Industries Wanted Partners Wanted Patents For Sale Patent Attorneys Plants For Sale Positions Vacant Positions Waoted Property For Sale Receivers' Sales Representatives Wanted Salesmen Waoted Vork Wanted Etc., Etc., Etc. Advertising, Street Car Collier, Inc., Barron G.

Air Brakes General Electric Co. Westinghouse Air Brake Co.

Anchors, Gay
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools Columbia Machine Works Elec. Service Supplies Co.

Antomatic Return Switch Stands Ramapo Ajax Corp.

Automatic Safety Switch Stands Ramapo Ajax Corp.

Axiee

Bemis Car Truck Co.

Bethiehem Steel Co.

Brill Co., The J. G.

Cincinnsti Car Co.

Standard Steel Worke Co.

Westinghouse E. & M. Co.

Axles (Front & Rear) Motor Truck & Passenger Car Timken-Detroit Axle Co.

Axies, Trailer & Motor Bus Timken-Detroit Axie Co.

Babbitting Devices Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry Nichole-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Westinghouse E. & M. Co.

Bearings, Center and Boiler Side Columbia Machine Works Stucki Co., A.

Belis and Buzzers
Consolidated Car Heating
Co.

Bells and Gongs Brill Co., The J. G. Cincinnati Car Co. Columbia Machine Works Elec. Service Supplies Co.

Benders, Raii Railway Track-work Co.

Bodies, Bus Brill Co., The J. G. Cummings Car & Coach Co. Graham Brothers

Body Material, Haskelite and Piymeti Haskelite Mfg. Corp.

Bollers Babcock & Wilcox Co.

Bond Testers American Steel & Wire Co. Electric Service Supplies Co.

Bonding Apparatus Amer. Steel & Wire Co. Elec. Service Supplies Co. Ohio Brass Co. Railway Track-work Co. Una Welding & Bonding Co.

Bonds, Rall
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, etc.)
Bates Expanded Steel Truse
Co.
Columbit Machine Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cinctnnati Car Co.
Nationat Ry. Appliance Co.
Westinghouse Tr. Br. Co.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Brake Shoes
American Brake Shoe &
Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Wheel Truing Brake Shoe
Co.

Brakes, Brake Systems and
Brake Parts
Bemis Car Truck Co.
Brili Co., The J. G.
Cincinnati Car Co.
Columbia Machine Co.
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Brakes, Magnetic Raii Cincinnati Car Co.

Brushes, Carbon General Electric Co. Westinghouse E. & M. Co.

Brushholders Columbia Machine Works General Electric Co.

Buikheads Haskelite Mfg. Corp.

Buses Cummings Car & Coach Co. General Electric Co. White Co., The

Bushings, Case Hardened & Manganese Brill Co, The J. G. Bemis Car Truck Co, Cincinnati Car Co, Columbia Machine Works

Cables. (See Wires and

Cambric Tapes, Yellow and Black Varnish General Electric Co. Irvington Varnish & Ins. Co.

Corbon Brushes (See Brushes, Carbon)

Car Lighting Flxtures Elec. Service Supplies Co.

Car Panei Safety Switches Cnnsolidated Car Heat. Co Westinghouse E. & M. Cu.

Car Steps, Safety Cincinnati Car Co.

Car Wheels, Rolled Steel Bethlehem Steel Co.

Cars, Dnmp
Brill Co., The J. G..
Differential Steel Car Co.,

Cars, Gas-Electric Brill Co., The J. G. General Electric Co. Westinghouse E. & M. Co.

Cars, Gas, Rail Brili Co., The J. G.

Cars, Passenger, Freight,
Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

Cars, Second Hand Electric Equipment Co.

Cars, Self-Propelled Brill Co., The J. G.

Castings, Brass Composition or Copper Cincinnati Car Co. Columbia Machine Works

Castings, Gray Iron aud Steel American Steel Foundries Bemis Car Truck Co. Columbia Machine Works Standard Steel Works Co.

Castings, Malicable & Brass Bemis Car Truck Co. Columbia Machine Works

Catchers and Retrievers, Trolley Elec. Service Supplies Co. Ohio Brass Co. Celling Car Haskelite Mfg. Corp. Pantasote Co., Inc.

Ceilings, Plywood, Paneis Haskelite Mfg. Corp.

Chairs, Parlor Car Heywood Wakefield Co.

Change Carriers
Cleveland Fare Box Cn.
Electric Service Supplies Co.

Change Trays Cincinnati Car Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables Columbia Machine Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. Hubbard & Co. Ohio Brass Co. Westingbouse E. & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms) Brill Co., The J. G. Cincinnati Car Co.

Coal and Ash Handling (See Conveying and Hoisthig Machinery)

Coli Banding and Winding Machines Columbia Machine Works Elec. Service Supplies Co. Westinghouse E. & M. Co.

Colls, Armatore and Field Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Coits, Choke and Kicking Elec. Service Supplies Co. General Electric Co. Westinghouse E. & M. Co.

Cnin Counting Machines Cleveland Fare Box Co. International Register Co. Johnson Fare Box Co.

Coin Changers
Ill Motive Equipment Co.
Johnson Fare Box Co.

Coin Sorting Machines Cleveland Fare Box Co. Johnson Fare Box C.

Coin Wrappers Cleveland Fare Box Co.

Commutator Stotters
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Commutators or Parts General Electric Co. Westinghouse E. & M. Co.

Compressors, Air General Electric Co. Westinghouse Tr. Br. Co.

Condensers Westinghouse E. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Connectors, Soiderless Westinghouse E. & M. Co.

Connectors, Trailer Car Columbia Machine Works Consolidated Car Heat. Co. Elec. Service Supplies Co. Ohio Brass Co.

Controllers or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators Elec. Service Supplies Co.

Controlling Systems General Electric Co. Westinghouse E. & M. Co.

Converters, Rotary General Electric Co. Westinghouse E. & M. Co. Copper Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining
Co.

Copper Wire Instruments,
Measuring, Testing and
Recording
American Brass Co., The
American Steel & Wire Co.
Anaconda Copper Mining
Co.

Cord, Bell, Trolley, Register, etc.
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., John

A. Samson Cordage Works

Cord Connectors and Coppiers Elec. Service Supplies Co. Samson Cordage Works

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cowi Ventilators Nichols-Lintern Co.

Cranes, Hoists and Lifts Buda Co., The Electric Service Supplies Co.

Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossing Foundations
Loternational Steel Tie Co.

Crossings, Frog and Switch Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Crossings, Manganese Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Crossing Signale. (See Signal Systems, Highway Crosslng)

Crossings, Track (See Track, Special Work)

Crossings, Troiley General Electric Co. Chio Brass Co. Westinghouse E. & M. Co.

Cortains & Cartain Fixtures
Brill Co., The J. G.
Pantasote Co., Inc.

Cotting Apparatus
General Electric Co.
Ohio Brass Co.
Railway Track Work Co.

Deaier's Machinery & Second Hand Equipment Elec. Equipment Co. Hyman Michaels Co.

Derailing Switches
Ramapo Ajax Corp.

Destination Signs Columbia Machine Works Elec. Service Supplies Co.

Detective Service Wish Service, Edward P.

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heat. Co.
National Pneumatic Co.

Doors and Door Fixtures Brill Co., The J. G. Cincinnati Car Co. Hale-Kilburn Co.

Doors, Folding Vestibule National Pneumatic Co. 7

Drilis, Track
Amer. Steei & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Dryers, Sand Elec. Service Supplies Co. Ohio Brass Co. Westinghouse E. & M. Co. Ears
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders Railway Track-work Co.

Electrical Wires and Cables Amer. Electrical Works Amer. Steel & Wire Co. John A. Roebling's Sons Co.

Electrodes, Carbon / Railway Track-work Co. Una Welding & Bonding Co.

Electrodes, Steel Railway Track-work Co. Una Welding & Bonding Co.

Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Beeler, John A.

Buchanan & Layng Corp.
Byllesby Co., H. M.
Day & Zimmermann, Iuc.
A. L. Drum & Co.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Waiter
Kelker & DeLeuw
McCleilan & Junkersfeld
Richey, Albert S.
Sanderson & Forter
Stevens & Wood
Stone & Webster
White Eng. Co., J. G., The

Engines, Gas, Oil or Steam Westinghouse E. & M. Co.

Exterior Side Panels Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Ill Motive Equipment Co.
Perey Mfg. Co.

Fare Registers
Elec. Service Supplies Co.
Johnson Fare Box Co.

Fences, Woven Wire and Fence Posts Amer. Steel & Wire Co.

Fenders and Wheel Guards Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Fender Co. Star Brass Works

Fibre and Fibre Tnbing Weedinghouse E. & M. Co.

Flaid Coile (See Coils)

Floodlights
Elec. Service Supplies Co.
General Electric Co.

Floor, Sub Haskelite Mfg. Corp.

Floore Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Worke Co.

Frogs & Crossings, Tee Rail Betblehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Frogs, Track (See Track Work)

Frogs, Trolley
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Fnses and Fuse Boxes
Columbia Machine Works
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

Gaskets Westinghouse Tr. Br. Co.

Gas-Electric Drive for Bases General Electric Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car Brill Co., The J. G. Cincinnati Car Co. (Continued on page 30) "The Standard for Rubber Insulation"

.

INSULATED WIRES and CABLES

"Okonite," "Manson," and Dundee "A" "B" Tapes

Send for Handbook

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories, PASSAIC, N. J.

PATERSON, N. J.

Offices: New York Chicago Pitteburgh St. Louis Atlanta Birmingham San Francisco Los Angeles Seattle

Pettingell-Andrews Co., Boston, Mass. F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Phila., Pa

Cucon Rep.: Engineering Materials Limited, Montreal.
Cucon Rep.: Victor O Mendoza Co., Havana.

Arc Weld Rail Bonds

Descriptive Catalogue Furnished

American Steel & Wire Company

CHICAGO, NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADEL-PHIA, PITTSBURGH, BUFFALO, DETROIT, CINCINNATI, BALTIMORE, WILKES-BARRE, ST LOUIS, KANSAS CITY, ST, PAUL, OKLAHOMA CITY, BIRMINGHAM, MEMPHIS, DALLAS, ATLANTA, DENVER, SALT LAKE CITY, EXPORT REPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK PACIFIC COAST REPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LOS ANGELES, PORTLAND, SEATTLE.

The DIFFERENTIAL CAR



Standard on 60 Railways for

Track Maintenance
Track Construction
Ash Disposal
Coal Hauling
Concrete Materials
Waste Handling
Excavated Materials
Hauling Cross Ties
Snow Disposal

Use These Labor Savers

Differential Crane Car Clark Concrete Breaker Differential 3-way Auto Truck Budy Differential Car Wheel Truck and Tractor

THE DIFFERENTIAL STEEL CAR CO., Findlay, O.



Breke Pins Brake Hangers Breke Levers Pedestal Gibs Brake Fulcrums Turnbuckles

and a substitution of the manufacture of the contrastitution of the contrastitution of the contrastitution of

Spring Post Bushings
Spring Posts
Boister and Transom
Chefing Piates
Manganese Brake Heade
Manganese Truck Parts Turnbuckles Manganese True
Center Bearings Bushings
Side Bearings Bronze Bearings
McArthur Turnbuckles

Can be purchased through the following representatives:

Economy Electric Devices Co. 72 W. Van Buren St., Chicago, Ill.

F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. W. F. McKenney, 54 First Street, Portland, Oregon.

J. H. Denton, 1328 Broadway, New York City, N. Y. A. W. Arlin, 519 Delta Bidg., Los Angeles, Cal.

Bemis Car Truck Company Springfield, Mass.

The Most Successful Men in the Electric Railway

. Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week



CREOSOTED

Railroad Crose-ties; Switch-ties; Bridge Timbers; Construction Timbers; Mine Timbers, Lumber; Piling; Poles; Posts and other Forest Products

F. Prettyman & Sons
Vood Preserving Plant
Charleston: S. C.

GOLD CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

WITH OPEN COIL OR ENCLOSED ELEMENTS ELECTRIC HEATERS THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE

Coin Counting and Sorting Machines

FARE BOXES

Lever-Operated and Slip Change Carriers

The Cleveland Fare Box Co. Cleveland, Ohio Canadlan Cleveland Fare Box Co., Ltd., Preston, Ont. NACHOD & UNITED STATES HIGHWAY CROSSING SIGNALS

SIGNAL CO., INC. LOUIZVILLE KY. **BLOCK SIGNALS** FOR ELECTRIC RAILWAYS



SAMSON SPOT WATERPROOFED TROLLEY CORD



of extra quality stock firmly braided and smoothly finished Carefully inspected and guaranteed free from flaws. Samples and information gladly sept.

SAMSON CORDAGE WORKS, BOSTON, MASS.

Gear Blanks Brill Co., The J. G. Standard Steel Works Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinlons
Bemis Car Truck Co.
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.

Generators General Electric Co. Westioghouse E. & M. Co.

Glrder Rails

Bethlehem Steel Co.

Lorain Steel Co.

Gongs (See Bells and Gongs) Grinders & Grinding Supplies Railway Track-work Co.

Grinders, Portable Electric Railway Track-work Co. Grinders, Portable Railway Track-work Co.

Grinding Bricks and Wheels Railway Track-work Co.

Guard Rail Clamps Ramapo Aiax Corp.

Guard Rails, Tee Rail and Manganese Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Harps, Trolley Columbia Machine Works Elec. Service Supplies Co. General Electric Co. Nuttall Co., R. D. Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Oblo Brass Co.

Headlining Columbia Machine Works Haskelite Mig. Corp. Pantasote Co., Inc.

Heaters, Bus Nichols-Lintern Co.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Go i Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water Smith Heater Co., Peter

Healers, Car. Stove Smith Heater Co., Peter

Helmets, Welding Railway Track-work Co. Una Welding & Bonding Co.

Hoists and Lifts Columbia Machine Works

Hose, Bridges Ohio Brass Co.

Hose, Pneumatic Westinghouse Tr. Br. Co.

Instruments, Measuring, Test-ing and Recording American Steel & Wire Co. General Electric Co. Westinghouse E. & M. Co.

Insulating Cloth, Paper and

Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Okonite Callender Cabls Co Inc. U. S. Rubber Co. Westinghouse E. & M. Co.

Insulating Machinery Amer. Ins. Machinery Co.

Insulating Silk Irvington Varnish & Ios. Co.

Insulating Varnishes
Irvington Varnish and
Insulating Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co
Irvington Varnish & Ins. Co.
Okonite Co.
Okonite-Callender Cable Co.
Inc. U. S. Rubber Co. Westinghouse E. & M. Co.

Insulation Slot Irvington Varnish & Ins. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Insulators (Sec also Line Materials)
Electric Ry. Equipment Co. Elec. Service Supplies Co. General Electric Co. Irvington Varnish & Ins. Co. Ohio Brass Co.
Westinghouse E. & M. Co.

Interior Side Linings Haskelite Mfg. Corp

Interurban Cars (See Cars, Passenger, Freight, Express, etc.)

Jacks (See also Holsts and Columbia Machine Works Elec. Service Supplies Co.

Journal Roxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnatl Car Co.

Lamps, Guards and Fixtures Elec. Service Supplies Co. General Electric Co. Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights) General Electric Co. Westinghouse E. & M. Co.

Lamps, Signal and Marker Elec. Service Supplies Co. Nichols-Lintern Co.

Lanterns, Classification Nichols-Lintern Co.

Letter Boards Cincinnati Car Co. Haskelite Mfg. Corp.

Lighting Fixtures, Interior Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.) Electric Ry. Equipment Co. Elec. Service Supplies Co. General Electric Co. Hubbard & Co. Ohio Brass Co. Westinghouse E. & M. Co.

Locking Spring Baxes Wm. Wharton, Jr. & Co.

Locomotives, Electric Cincinnati Car Co. Cummings Car & Coach Co. General Electric Co. Westinghouse E. & M. Co.

Lubricating Engineers Universal Lubricating Co.

Lubricants, Oil and Grease Universal Lubricating Co.

Lumber (See Poles, Tics,

Machinery, Insulating
American Insulating Machinery Co.

Manganese Parts Bemis Car Truck Co.

Manganese Steel Guard Rails Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Manganese Steel, Special Track Work Bethlehem Steel Co. Wm. Wharton, Jr. & Co.

Manganese Steel Switches, Frogs & Crossings Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Mirrors, Inside and Outside Cincinnati Car Co.

Mutors, Generators, & Con-trols for Gas Electric Buses General Electric Co.

Motor Buses (See Bases)

Motorman's Seats Brill Co., The J. G. Cincinnati Car Co. Elec. Service Supplies Co. Heywood Wakefield Co.

Mators, Electric General Electric Co. Westinghouse E. & M. Co. Nuts and Bolts
Bemis Car Truck Co.
Cincinnati Car Co.
Hubbard & Co.

Oxyacetylene—See Cutting

Oxygen International Oxygen Co.

Packing
U. S. Rubber Co.
Westinghouse Tr. Brake Co.

lating)
Electric Service Supplies Co.
Irvington Varnish & Ins. Co.

Paints and Varnishes, Railway Dixon Crucible Co. Nat'l Ry. Appliance Co.

Pickups, Trolley Wire Elec. Service Supplies Co. Ohio Brass Co.

Pinion Pullers Elec. Service Supplies Co. Pinions (See Gears)

Pins, Case Hardened, Wood and Iron Bemis Car Truck Co. Ohio Brass Co. Westinghouse Tr. Brake Co.

Pipe Fittings Standard Steel Works Co. Westinghouse Tr. Brake Co.

Planers (See Machine Tools) Plates for Tee Rail Switches Ramapo Ajax Corp.

Pliers, Rubber Insulated Elec. Service Sup. Co.

Plywood, Roofs, Headlinings, Floors, Interior Panels, Bulkheads, Tross Planks Haskelite Mfg. Corp.

Pole Line Hardware Bethlehem Steel Co. Elec. Service Supplies Co. General Electric Co. Ohio Brass Co.

Pole Reinforcing Hubbard & Co.

Poles, Matal Street
Bates Expanded Street
Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.

Poles, Ties, Posts, Plling & Lamber Bell Lumber Co. Naugle Pole & Tie Co. Prettyman & Sons, J. F.

Poles & Tles Treated Bell Lumber Co.

Poles, Trolley
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Pothesds Okonite-Callender Cable Co., Okonite Co.

Power Saving Devles National Ry. Appliance Co.

Pressings, Special Steel Cincinnati Car Co.

Pressure Regulators General Electric Co. Westinghouse E. & M. Co. Westinghouse Tr. Brake Co.

Punches, Ticket International Register Co.

Rail Filler Carey Co., The Philip

Rail Braces & Fastenings Ramapo Ajax Corp.

Rail Grinders (See Grinders) Rail Joints Rail Joint Co.

Rail Joints, Welded Lorain Steel Co.

Rail Welding Railway Track-work Co. Una Welding & Bonding Co.

Ralls, Steel Electric Equipment Co.

Rallway Safety Swliches Consolldated Car Heat. Co. Westinghouse E. & M. Co.

Railway Welding (See Welding Processes)

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Elec. Service Supplies Co.
Hale-Kilburn Co.
Heywood Wakefield Co.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
International Register Co.

Reinforcement, Concrete Amer. Steel & Wire Co Bethlehem Steel Co. Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines) Elsc. Service Supplies Co.

Repair Work (See also Colls) Westinghouse E. & M. Co.

Replacers, Car Cincinnati Car Co. Elec. Service Supplies Co.

Resistance, Wire and Tube Westinghouse E. & M. Co.

Resistances Resistances Consolidated Car Heat. Co. General Electric Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats General Electric Co. Westinghouse E. & M. Co.

Rnofing, Car Haskelite Mfg. Corp. Pantasote Co., Inc.

Roofs, Car and Bus Haskelite Mfg. Corp.

Rubber Specialties of All Kinds U. S. Rubber Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car Brill Co., The J. G. Cincinnati Car Co.

Sash Metal Car Window Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Haskelite Mfg. Corp.
Heywood Wakefield Co.
Pantasote Co., Inc., The

Seats, Bus Brill Co., The J. G. Hale-Kilburn Co.

Seats, Car (See also Rattan) Brill Co., The J. G. Cincinnati Car Co. Hale-Kilburn Co. Heywood Wakefield Co.

Second Hand Equipment Electric Equipment Co. Hyman Michaels Co.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Shovels

Brill Co., The J. G.

Hubbard & Co.

Shoveis, Power Brill Co., The J. G.

Signals, Car Starting Consolidated Car Heating Co. Elec. Service Supplies Co. National Pneumatic Co.

Signal Systems, Block Elec. Service Supplies Co. Nachod and U. S. Signal Co., Inc. Union Switch & Signal Co.

Signal Systems, Highway Crossing
Nachod and U. S. Signal
Co., Inc.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cuiters Cincinnati Car Co., Columbia Machine Works Elec. Ry. Equipment Co., Elec. Service Supplies Co., Nuttall Co., K. D.

Smokestacks, Car Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brooms
Brioms
Briol Co., The J. G.
Columbia Machine Works
Consoldated Car Fender Co.
Cummings Car & Coach Co.

Snow Sweeper, Rattan Heywood Wakefield Co.

Soldering and Brazing (See Welding Processes and Apparatus)

Special Adhesive Papers Irvington Varnish & Inc. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co., The
Wm. Wharton, Jr. & Co.

Spikes Amer. Steel & Wire Co.

Splicing Compounds
U. S. Rubber Co.
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
American Steel & Wire Co.
American Steel Foundries
Bemis Car Truck Co.
Brill Co. The J. G.
Cincinnati Car Co.
Standard Steel Works Co.

Sprinklers, Track and Road Brill Co., The J. G. Cummings Car & Coach Co.

Steel and Steel Products
American Steel & Wire Co.

Steps, Car Brill Co., The J. G Cincinnati Car Co.

Stokers, Mechanical Babcock & Wilcox Co. Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batterles (See Bat-teries, Storage)

Strain, Insulators
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westingbouse E. & M. Co.

Strand American Steel & Wire Co. Roebling's Sons Co., J. A.

Street Cars, Passenger (See Cars, Passenger, Freight, Express, etc.)

Superheaters Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures Ramapo Ajax Corp.

Switches General Electric Co.

Switches, Selector Nichols-Lintern Co.

Switches and Switchboards Consolidated Car Heating Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Switches, Tee Rail Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tle Railway Track-work Co.

Tapes and Cloths (See Idaulating Cloth, Paper and Tape)

Tes Rail Special Track Work Ramapo Ajax Corp.

Telephone and Telegraph Wire American Steel & Wire Co. J. A. Roebling's Sons Co.

(Continued on page 32)

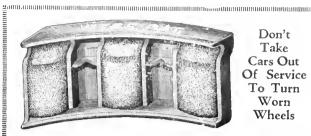
Haskelite Manufacturing Corporation, 133 West Washington Street, Chicago

VOMPANU

COMFORT WITH

HEATERS REGULATORS VENTILATORS

1328 Broadway New York, N. Y



Don't Take Cars Out Of Service To Turn Worn Wheels

HE WHEEL TRUING BRAKE SHOE does the work while your car is in service. Don't jeopardize your Use Wheel Truing Brake Shoes and keep the maximum equipment in service. They save time, labor and money.

WHEEL TRUING BRAKE SHOE CO. Detroit. Mich.



RAIL GRINDERS AND WELDERS

Railway Track-work Co., Philadelphia

BUTT TREATING ALL GRADES

TIES

BELL LUMBER CO., Minneapolis, Minn

Phono-Electric

Contact wire that gives three times the service of hard drawn copper. Hi-strength messenger and guy wires. Write for details.

> Bridgeport Brass Co. Bridgeport, Conn.

INDUSTRIAL GASES

ACETYLENE **OXYGEN**



HYDROGEN NITROGEN

Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.

International Oxygen Co., Main Offices: Newark, N. J. New York Pittsburgh



Rod, Wire and Cable Products

ANACONDA COPPER MINING COMPANY THE AMERICAN BRASS COMPANY General Offices - 25 Broadway, New York

NACONDA TROLLEY WIRE

Electrical Wires & Cables John A. Roebling's Sons Co. Trenton, N. J. Efficient Bus Heating

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.

7960 Lorain Ave. Zmittattantitantitantini Z

Cleveland, Ohio รื่อเตเมนาเหมนากเนมนานเมนาเหมนานเกมนาเกมเกมเกมเกม

H B LIFE GUARDS

PROVIDENCE FENDERS

Manufactured by

CONSOLIDATED CAR FENDER CO., PROVIDENCE, R. I.

General Sales Agents WENDELL & MacDUFFIE Co., 110 E. 42nd St., N. Y. C.



STUCKI SIDE BEARINGS

A. STUCKI CO. Oliver Bldg. Pittsburgh, Pa



CHILLINGWORTH

One-Piece Gear Cases

eamless—Riveticss—Light Weight test for Service — Durability and Economy. Write Us.

Chillingworth Mfg. Co. Jersey City, N. J.



WHAT AND WHERE TO BUY—Continued from page 50

Telephones and Parts Elec. Service Supplies Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats Consolidated Car Heating Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers Elec. Service Supplies Co.

Tles and Tie Rads, Steel International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires U. S. Rubber Co.

Tongue Switches Wm. Wharton, Jr. & Co.

Tools, Track & Miscella-Coois, Track & Miscella-neous
Amer. Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Hubbard & Co.
Bailway Track-work Co.

Towers and Transmission Structures
Bates Expanded Steel Truss Westinghouse E. & M. Co.

Track Grinders
Railway Track-work Co.
Ramapo Ajax Corp.

Track, Special Work Columbia Machine Works Ramapo Ajax Corp.

Truckless Tralley Cars Brill Co., The J. G.

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Trends, Safety Stair Car Steps Cincinnati Car Co.

Tree Wire Okonite Callender Cable Co. Okonite Co.

Trolley Bases
Ohio Brass Co.
Nuttall Co., R. D.
Westinghouse E. & M. Co.

Trolley Bases, Retrieving Nuttall Co., R. D.

Trolley Buses
Brill Co., The J. G.
General Electric Co.

Trolley Material, Overhead Elec. Service Supplies Cn. General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wheel Bushings Star Brass Works

Trolley Wire
American Brass Co.
Amer Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.. The
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.

Trucks, Mntor
White Co., The
Truss Planks
Haskelite Mig. Corp.
National Tube Co.

Tubing, Yellow & Black
Flexible Varnishes
Irvington Varnish & Ins.
Co.

Turbines, Steam General Electric Co. Westinghouse E. & M. Co.

Turnstiles Elec. Service Supplies Co. Perey Mig. Co., Inc.

Turntables
Elec. Service Supplies Co.

Valves Ohio Brass Co. Westinghouse Tr. Br. Co.

Varnished Papers & Silks Irvington Varnish & Ins. Irvington Varnish & Ins. Co. Varnishes (See Paints, etc.)

Ventilators National Ry. Appliance Co.

Ventilators, Car Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Heating

Nichols-Lintern Co.
Railway Utility Co.
Vestibule Linings
Haskelite Mfg. Corp.

Welded Rail Joints
Lorain Steel Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric General Electric Co. Ohio Brass Co. Railway Track-work Co. Una Welding & Bonding Co. Westinghouse E. & M. Co. Welders Park Land.

Welders, Rnil Joint General Electric Co. Ohio Brass Co. Railway Track-work Co.

Welding & Cutting Tools International Oxygen Co.

Welding Processes and Welding Processes and Apparntus Ohio Brass Co. Railway Track-work Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Welding Steel isallway Track-work Co. Una Welding & Bonding Co.

Welding Wire
American Steel & Wire Co.
Railway Track-work Co.
Roebling's Sons Co., J. A.

Welding Wire and Rode Railway Track-work Co.

Wheels, Car, Steel & Steel Tired American Steel Foundries Bemis Car Truck Co. Standard Steel Works Co.

Wheels, Trolley Columbia Machine Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. Nuttall Co., R. D. Star Brass Works

Wheel Guards (See Fenders and Wheel Guards)

Wheel Grinders
Wheel Truing Brake Shoe
Co.

Wheel Presses (See Machine Tools)

Whistles, Air Ohio Brass Co. Westinghouse E. & M. Co. Westinghouse Traction Brake Co.

Window Guards and Fittings Cincinnati Car Co.

Wire Rope American Steel & Wire Co. Roebling's Sons Co., J. A.

Wires and Cables
American Brass Co., The
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Mining
Co.
Bridgeport Brass Co., The
Okonite Co.
Okonite-Callender Cable Co.,

Roehling's Sons Co., J. A Westinghouse E. & M. Co.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page Drum & Co., A. L...... 24 American Brasa Co., The..... 31
American Car Co..... Third Cover
American Electrical Works.... 32
American Insulating Machinery Kelker, DeLcuw & Co..... 24 Kuhlman Car Co..... Third Cover

 Samson Cordage Works.
 29

 Sanderson & Porter
 24

 Searchlight Section
 27

 Smith Heater Co., Peter.
 25

 Standard Steel Works Co.
 12

 Star Brass Works. The
 22

 Stevens & Wood, Inc.
 24

 Stone & Webster.
 24

 Stucki Co., A
 31

 Electric Equipment Co......26-27 Electric Ry. Equipment Co.....22 Electric Service Supplies Co....9 Co. 22

American Steel & Wire Co. 29

American Steel Foundries 4

Anaconda Copper Mining Co. 31 McClellan & Junkersfeld 24 Nachod and United States Signal

 Nachod and United States Signal
 29

 Co., Inc.
 29

 National Brake Co.
 19

 National Pneumatic Co.
 1i

 National Ry. Appliance Co.
 22

 Naugle Pole & Tie Co.
 29

 Nichols-Lintern Co., The.
 31

 Nuttall Co., R. D.
 23

 General Electric Co.....16, 17, 18 Gold Car Heating & Ltg. Co.... 29 Timken-Detroit Axle Co., The. Fourth Cover

 Hale-Kilhurn Co.
 25

 Haskelite Mfg. Corp.
 31

 "Help Wanted" Ads.
 26-27

 Hemphill & Wells.
 24

 Heywood-Wakefield Co.
 21

 Hoist Englehardt W.
 24

 Hubbard & Co.
 29

 Hyman-Michaels
 Co.
 26-27

 Una Welding & Bonding Co... 25
Union Switch & Signal Co... 8
United States Rubber Co... 15
Universal Lubricating Co., The. 25 Ohio Brass Co..... Okonite-Callendar Cable Co., Inc.

 Carey Co., The Philip.
 14

 Chillingworth Mfg. Co.
 31

 Cincinnati Car Co.
 13

 Cleveland Fare Box Co.
 29

 Collier, Inc., Barron G.
 20

 Consolidated Car Fender Co.
 31

 Consolidated Car Heating Co.
 31

 Consolidated Car Heating Co.
 31

 Cummings Car & Coach Co.
 10

 Illinois Motive Equipment Co... 25 International Oxygen Co..... 31 International Register Co... 22 International Steel Tie Co., The. 7 Irvington Varnish & Insulator Wheel Truing Brake Shoe Co. . . 31
White Co., The Front Cover
White Eng. Corp., The J. G. . . . 24
Wish Service, The P. Edw. . . . 25 Day & Zimmermann, Inc..... 24 Differential Steel Car Co., The.. 29
 Jackson, Walter
 24

 Johnson Fare Box Co
 23





AMELECTRIC PRODUCTS BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

.

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 20-32 West Randolph Street. Ciacinnati, Tractica Bldg.: Naw York, 100 E. 42ad St.

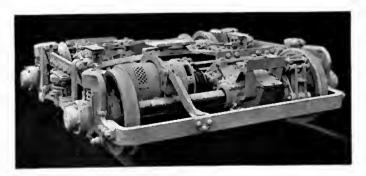


Will get more than "necessity riders"

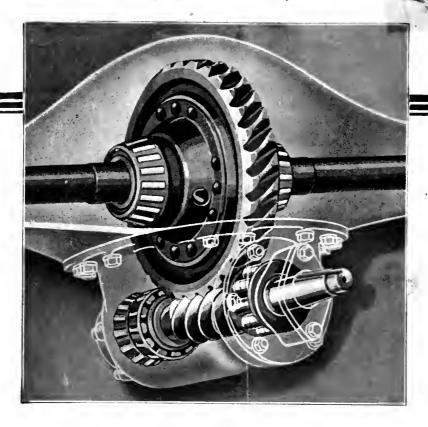
A new year with all its hopes and opportunities has dawned. To some railways, already using cars which appeal to the riders, it means increased riding; to others it means an opportunity to place in service new modern cars which will enable them to provide a service which will attract others than those who ride of necessity.

How its trucks meet modern demand

The Brill No. 277-EX trucks under "the car for 1928" designed and built by Brill include a number of innovations in keeping with modern demand. With light-weight high-speed motors off the axles, a double-reduction gear unit in oil, and external-contracting clasp type shoe brakes on axle drums, desirable noise reduction is accomplished. At the same time such conventional design features as contribute to its smooth and comfortable riding are retained.



Brill No. 277-EX Truck with W-N Drive and drum brakes meets the modern demand without sacrificing the important features of conventional design established in years of practical operation.



Since 1904—the finest quality

Experience and sincerity built into any product mean a good product. They are built into Timken Axles. (Since 1904 experience has brought increasing knowledge and additional proof of the superiority of Timken Axles. (There has not been any increase in Timken's insistence upon the highest quality—there couldn't be.



TIMKEN AXLES

ANNUAL STATISTICAL AND FORECAST ISSUE

ELECTRIC RAILWAY JOURNAL

McGraw-Hill Publishing Company, Inc.

JANUARY 14, 1928

Twenty Cents per Copy

SHONO-ELECTRIC BRIDGEPORT BRASS CO. Bridgeport, Conn.



W-N Drive Installation

W-N Drive advantages

Lowest steps
Faster acceleration
Quiet operation
Motors spring borne
Gears run in oil
Greater clearance
Lighter weight
Lower maintenance

"Let's all go for a ride

—in the new W-N Street Car

it rides better than an Auto"

THERE was a time not so long ago that people took the street cars just for a ride—that was before the day of cheap autos.

Now the new W-N drive is popularizing car riding again and bringing back business that rightfully belongs to the street railway companies.

The low steps, comfortable riding qualities, quiet operation and fast acceleration of W-N Drive Cars are giving the public a new idea of street car transportation.

The automobile and the motor bus are no longer competition; the W-N Drive gives luxurious transportation—at a fraction of the cost.

Street railway companies can now capitalize on new equipment with W-N Drive because of increased patronage and lower maintenance.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse

MORRIS BUCK Managing Editor JOHN A. MILLER, JR. Associate Editor CLARENCE W. SQUIER Associate Editor O. W. JAMES, JR. Assistant Editor

T. C. . 1.1.

BURGIRIG RATIONA

CHARLES GORDON, Editor

HENRY W. BLAKE Senior Editor GEORGE J. MAOMURRAY News Editor

PAUL WOOTON Washington Correspondent

ALEX McCALLUM Editorial Representative London, England

Vol. 71 No. 2

CONTENTS

Pages 39-102

Annual Statistical Number

Expansion of Rus Operation Considered

30

Persistent Improvement Is the Price of Success 39	During Past Year
Track Reconstruction in 1927 Largest in Many Years. 40	Number of buses operated by electric railways increased
Bus Operation Expanding Along Sound Lines 40	nearly 20 per cent. Purchases of new equipment were
The Need for Ignoring Tradition 1s Greater than	slightly less than the year before. Bus route extensions made in 1927 total more than 3,000 miles.
Ever Before	made in 1997 cour more than 0,000 inites.
Budgets for 1928 Show Confidence	420 676 000 of Paula Diagraf
Car Situation Demands Earnest Attention 41	\$39,676,000 of Bonds Placed70
Dailman Operations Cham Rasia Improvement 42	Bulk of financing was done by city systems at prices that compare favorably with those to other borrowers under
Railway Operations Show Basic Improvement 42	present conditions. Maturities for the year are much
Stabilization has followed the economic upset caused by the war, and improvement can be looked for in 1928.	lower than for 1927.
Industry statistics cover trends of revenues and expenses,	
as well as comparisons with other indices of business.	Only a Mint Doesn't Need to Merchandise73
And a second of the minimum of the management of	By G. J. MACMURRAY
\$246,142,000 Expenditure Planned by Railways	There are no dusty answers here. A new day is being
for Plant and Materials45	greeted in a new way by railways in the work of finding
This figure, the largest for several years, follows a slight recession in 1927. Large expenditures for track construc-	the open sesame to the future.
tion in contemplation indicate confidence in rail trans-	T1
portation.	Electric Railway Costs and Fares in 192779
	By Albert S. Richey
Statements from Leading Executives Give High	General commodity prices have dropped slightly during the year, followed by similar reductions in construction
Spots of Year's Operations47	costs. Fares and wages show increases.
While traffic was somewhat less in 1927, better business	
is anticipated by many leading operators. Comments indicate that progressive measures have resulted advan-	Receiverships Reduced in 192782
tageously to the companies adopting them.	With the exception of one year, the mileage of companies
	going into the courts was less than in any year since 1916,
Marked Increase in Track Construction in 1927.51	Many properties have been returned to their owners.
Mileage of electric railway track rebuilt exceeded that of	
any other recent year. Extensions were slightly less than in 1926. Amount of track abandoned was small compared	Manufacturers Reflect Confidence for 192885
with amount of new bus routes added.	Continuation of good times seen in opinions of industrial
	leaders and reports of 100 industrial business and engi-
Passenger Car Purchases Low in 192756	neering editors. Manufacturers close to electric railway industry look on new year with confidence.
Much attention was given during the year to experimental	industry look on new year with confidence.
development of passenger cars and trucks. There were 824 city type passenger cars, 121 interurban passenger	Association Activities90
cars, 40 electric locomotives and 363 freight and miscel-	i isociation i ictivities
laneous cars ordered during 1927. This is a low volume	Nove of the Industry
for new electric railway rolling stock.	News of the Industry91

McGRAW-HILL PUBLISHING COMPANY, INC., Tenth Ave. at 36th St., New York, N. Y.

JAMES H. McGRAW, President
JAMES H. McGRAW, Jr., V.-Pres. and Treas,
MALCOLM MUIR, Vice-President
EDWARD J. MEHREN, Vice-President
MASON BRITTON, Vice-President
EDGAR KOBAK, Vice-President
C. H. THOMPSON, Secretary

NEW YORK District Office, 285 Madison Ave. WASHINGTON, National Press Building CHICAGO, 7 South Dearborn St. PHILADELPHIA, 1600 Arch St. CLEVELAND, Guardian Building ST. LOUIS. Bell Telephone Building SAN FRANCISCO, 883 Mission Street LONDON, 6 Bouverie Street, London, E. C. 4

Cable Address "Machinist, N. Y."

Publishers of Engineering News-Record American Machinist Power Chemical and Metallurgical Engineering Coal Age - Engineering and Mining Journal Electrical Internacional Electric Railway Journal Sus Transportation Construction Methods Electrical World Radio Retailing

teal World Radio Ret
Electrical West
(Published in Son Froncisco)
American Machinist—European Edition
(Published in London)

1928

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hewali, Philippines, Porto Rico, Canal Zone, Hondures, Cuba, Nicaragua, Peru, Colombia, Bolivis, Dominican Republic, Peneme, El Salvador, Argentina, Brazil, Spain, Uruguey, Costa Rica, Ecuador, Guatemaia, Chile, Paraguay and Hatti. Extra foreign postage to other countres, \$3 (total \$7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Slagle copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given. Notice to be received at least ten days before the change takes place.

Copyright, 1928, by McGraw-Hill Publishing Company, Inc. Published weekly
Entered as second-class matter June 23, 1998, at the Post
Office at New York, N. Y., under the Act of March 3, 1879.
Printed in U. S. A.

Number of Copies Printed 6,594

Member Associated Business Papers, Inc. Member Audit Bureau of Circulations

BETTER TRANSPORTATION



Eureka Rail Grinder. 'Flexible manipulation of grinding wheel is made easy.



Eureka Rail Grinder. Grinding wheel arm swings aside to pass ears without remnving trolley pole.

If statistics prove anything they prove this—

That good service will sell electric railway transportation.

That it's your public, not you, who decides what good service is.

That the public idea of good service is a swift, comfortable, silent, safe ride.

That such service is possible only on smooth track.

That putting and keeping track in good condition is the very foundation of electric railway transportation such as your public wants.

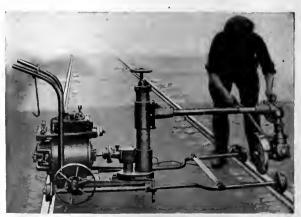
That rail grinding and arc welding with modern tools is at the same time an economy and a revenue stimulation.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

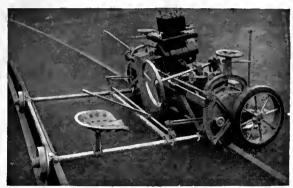
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electric Engineering & Mfg. Co., Pittsburgh
H. F. McDermott, 208 S. LaSalle St., Chicago
P. W. Wood, Railway Supply Co., New Orleans, La.
Equipment & Engineering Co., London
Frazar & Co., Japan



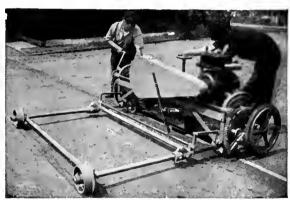
Eureka with Outrigger for open track,

DEMANDS BETTER TRACK

Here are the tools, you're probably using some of them Sure you have enough?



"Improved Atlas" Rail Grinder



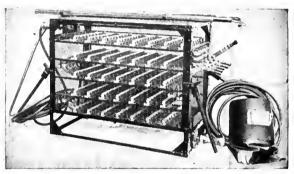
"Vulcan" Rail Grinder



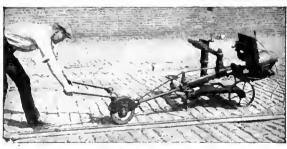
"Imperial" Track Grinder



Reciprocating Track Grinder



"Ajax" Electric Are Welder



"Hercules" Swing Frame Rail Grbider

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York Chas, N. Wood Co., Boston Electric Engineering & Mfg. Co., Pittsburgh H. F. McDermott, 208 S. LaSalle St., Chicago Equipment & Engineering Co., London P. W. Wood, Railway Supply Co., New Orleans, La. Frazar & Co., Japan



The Safety Car Control Equipment brings economic advantages that warrant additional cars, assures the quickest possible brake action provides maximum convenience and flexibility in controlling entrance and exit, safeguards operation by interlocking power, brakes, and doors.



1ccelerated Transportation must be made SAFE

For the sake of their patrons . . . and their profits . . . modern railways must expedite the movement of traffic.

Today there is a growing demand for more frequent service . . . shorter, quicker stops . . . less delay at entrance and exit . . . a speedier getaway.

All of these requirements are met to an efficient degree by the use of complete protective and convenience-promoting devices . . . the Safety Car Control Equipment.

Safety Cars assure accelerated transportation — properly safeguarded.



They Wear More Slowly



O make the "One-Wear" steel wheel practical required a special steel that would give long life without the need of re-turning. Superior wear resistance was essential. By using a Special Composition, heat-treated steel, the Davis "One-Wear" Steel Wheel extends wheel life and relieves the shop of maintenance. It is a logical "One-Wear" Wheel.

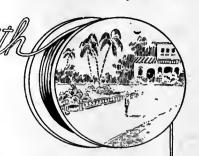
AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST.LOUIS







38 years of Phono-Electric in Brooklyn, N. Y.

Baseball fans need no introduction to Brooklyn. The "Dodgers" have become nationally famous.

But there is more truth than fiction in this nickname. Brooklyn's population has grown steadily. The surface lines have had to shoulder an increasing burden of traffic, and today this traffic is so heavy in the downtown districts that Brooklynites certainly have to do a lot of "dodging."

All of which points to a big responsibility for the trolley wire, especially at curves and intersections. And for 38 years past the Brooklyn City Railroad has safeguarded such points by using Phono-Electric. Today the mileage of Phono installed exceeds 32% of the entire wire mileage—certainly a strong recommendation of Phono's continued satisfactory and economical service.

A copy of the Phono Book telling just why Phono-Electric outwears ordinary hard drawn copper two to three times will be sent you on request.





For Your Ready Reference ESSCO Catalog No. 7

To increase your patronage, add attractiveness and efficiency to your cars by selecting your equipment from the broad line of Keystone Car Specialties.

They're all listed, described and illustrated in ESSCO Catalog No. 7.

Send for your copy today!

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motora Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agenta, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

Some items found in ESSCO CATALOG No. 7

Golden Glow Headlights
Faraday Signal
Systema
Hunter-Keystone
Signa
Steel Gear Cases
Motorman's Seats
Lighting Fixtures
Headlight Resistances
Air Sandera
Trolley Catehers
Shelby Trolley Poles
Rotary Gonga
International Fare
Register
Fare Register Fittings

Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors

Automatic Door
Signals
Standard Trolley
Harps
Standard Trolley
Wheels
Peerless Coil Winding
Toola
Peerless Armature
Machines
Insulating Materials
Cass Commutator
Stones
Sand Driers
Peerless Pinlon
Pullera
Employees' Badges
Line Material
Portable Lamp
Guarda

Electric Service Supplies Co.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL



There is something more than Safety in the Westinghouse Automotive Air Brake

Combatting the ever present evil of "brake riding," the Westinghouse Automotive Air Brake has come to be recognized not alone for its positive, safe, quick action—but as a potent economic necessity.

We feel safe in saying that more than half the expense of brake lining is wasted through nervous anticipation on the part of the driver, which is known as "brake riding"—the direct unconscious result of lack of confidence in ordinary brakes.

With the Westinghouse Automotive Air Brake, responsive to the slightest touch, unnecessary braking is minimized if not entirely eliminated, drivers are in turn relieved from undue mental and physical strain...and, as a consequence, an entire service is bettered.

Cut your braking expense . . . insure safety . . . get fuller information on the many advantages of the Westinghouse Automotive Air Brake from any of our conveniently located offices. This service is maintained for the exclusive use of the coach operator and is in no way obligatory.

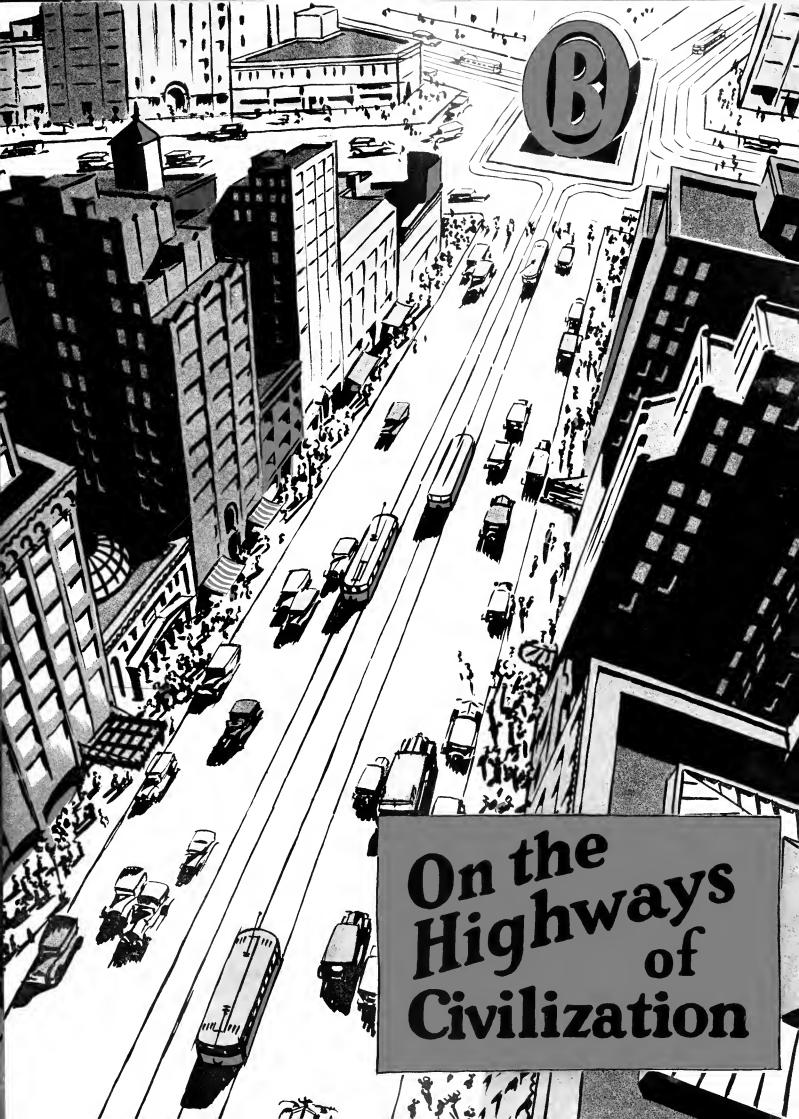
WESTINGHOUSE TRACTION BRAKE COMPANY
Automotive Brake Division: WILMERDING, PENNA.



The Westinghouse Air Brake is standard equipment on many of the most prominent coaches.
. on many others it is optional equipment, approved and recommended by the manufacturer who is equipped to install the system upon specification.

6200





On the highways of civilization—

In the busy streets of today much is beheld which contrasts sharply with the plodding roads of the past—much which foretells greater wonders for the teeming marts of the future.

Progress, couched in terms of mechanical power, expressed in units of electricity, sways all. Electricity, symbol of present day progress, applied to industry, has changed the doldrums of the long ago into the brilliant attainments of the present. Electricity, too, will usher in greater fulfillment for the morrow.

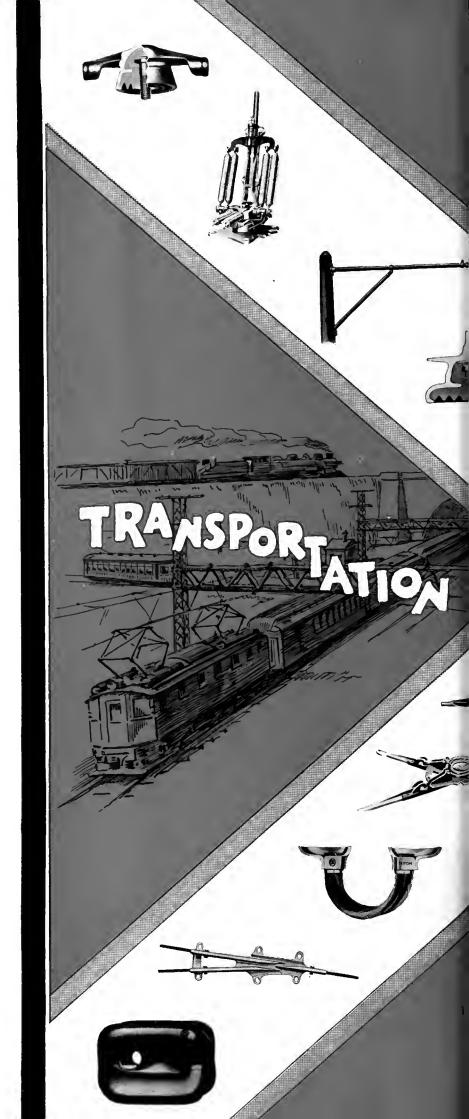
But this progress, this electrified civilization of ours, has been no sinecure. Instead it has been the result of tenacious mental and muscular effort long sustained. It has exacted great contributions from many thinkers and doers, not the least of whom are the electrical manufacturers. They, too, have helped in this electrical achievement — have played a part in advancing the outposts of world-wide progress.

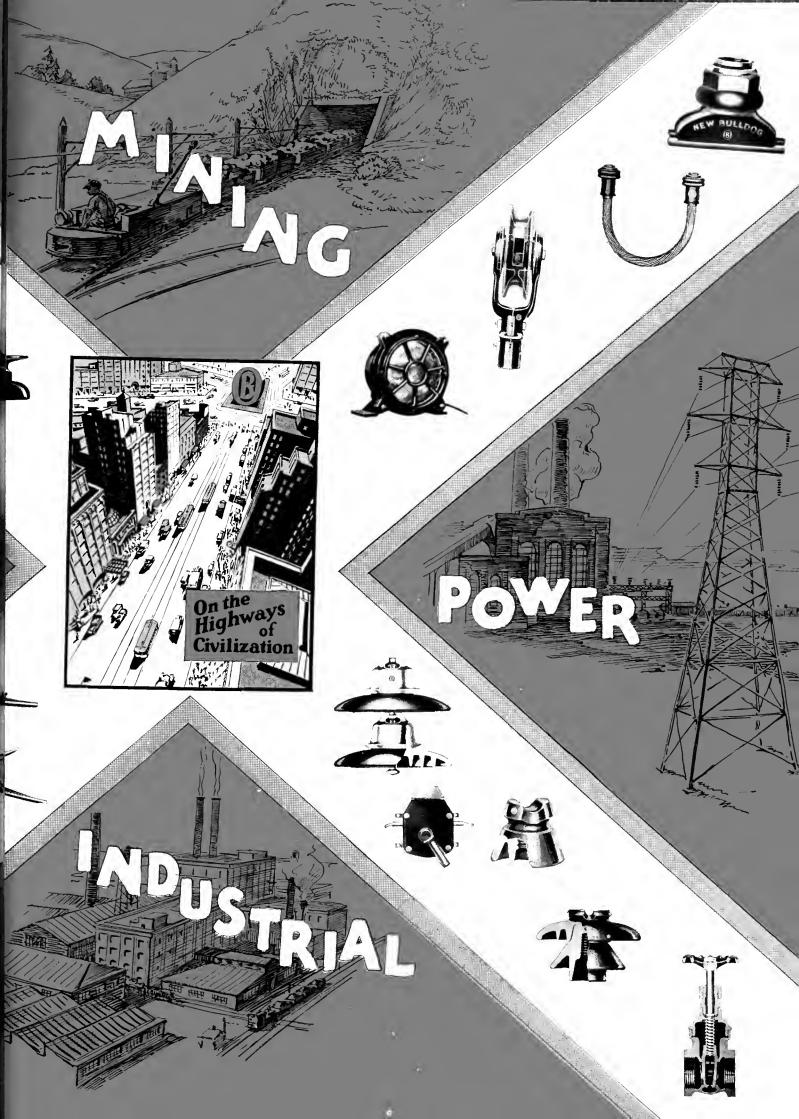
Answering the demand of the day for nearly 40 years, the O-B trademark has traveled over high seas and across continents. Circling the globe, it has dropped down shafts into mines, rested on rails under steam locomotives, shot up into the air on wires carrying electrical loads, affixed itself to pipes in millions of homes and workshops. Unnoticed, unknown by the multitude, O-B has carried on.

And many men in many lines of business realize that,—men who know full well that the O-B trademark has been an important factor in the successful carrying on of their business ventures. They know it has stood for sound progress always.

Ohio Brass Company, Mansfield, Ohio Dominion Insulator & Mfg. Co., Limited Niagara Falls, Canada 781G







Brass Co

PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS

Main Office and Plant: Mansfield, Ohio, U. S. A.

Porcelain Insulator Plant

Barberton, Ohio, U. S. A.

Branch Offices

50 Church Street - - NEW YORK, N. Y.

343 S. Dearborn Street - - CHICAGO, ILL.

1404 Packard Building - PHILADELPHIA, PA.

215 Market Street - SAN FRANCISCO, CAL.

2044 Oliver Building - - PITTSBURGH, PA.

417 S. Hill Street - - Los Angeles, Cal.

1300 Union Trust Building - CLEVELAND, OHIO

Dominion Insulator & Manufacturing Company, Limited

(Manufacturing Ohio Brass Co. Products in Canada)

NIAGARA FALLS, CANADA

Braach Offices

801 CPR Building - TORONTO-2

1188 Phillips Place - MONTREAL

Foreign Sales Agents

Frederic Attwood, General European Agent, 18 rue de Tilsitt - PARIS, FRANCE

Foreign Agents

Messrs. Frowijn & Co., Apeldoorn, Holland

Ingenior Gabriel Greiff,

Amerikalinjens Gaard - OSLO, NORWAY

Oscar Dieden - - - STOCKHOLM, SWEDEN

Ing. Carlo Petiti - - - TURIN, ITALY

K. Randa - - - - VIENNA, AUSTRIA

Ateliers de Constructions Electriques de Charleroi - - CHARLEROI, BELGIUM

Omnium Iberico Industrial - MADRID, SPAIN

Carr, Haynes & Cia - - SANTIAGO, CHILE

Kendall Knight & Co.

MELBOURNE and SYDNEY, AUSTRALIA

Carrick Wedderspoon, Limited - CHRISTCHURCH and PALMERSTON NORTH, NEW ZEALAND

PRODUCTS

Porcelain Insulators

For all voltages and applications. Plu types; suspension; wall, roof, transformer and oil switch bushings; pillar; switch and special forms; strain insulators and fittings; third rail insulators.

lligh Tension Line liurdware.

Trolley and Line Materials

Trolley hangers; enrs; clamps; frogs; splicers; cross-overs; section insulators; pole brackets; gny wire fiftings; cateaary hangers and clips; trolley guard.

Rail Bonds

For head, web and base of rall, also for third rail; electric arc-weld, gas weld and mechanically applied.

Electric Railway Car Equipment

Tomlinson automatic car, alr and electric couplers for light and heavy traction; trolley catchers and retrievers; alr sander equipment; city, suburban and laterurban car headlights; frolley wheels and harps; trolley bases.

Valves (Brass)

Globe-gate-angle-check for steam, hot or cold water, gas, alr and special service.

Mining Materials

Trolley hangers; clamps; frags; splicers, crossovers; section insulators; pole brackets; gay wire fittings; trolley wheels and harps; trolley shoes; locomative headlights and ather miscellaneous electric haulage and power feeder line materials.





Use the WESTINGHOUSE Variable Load Brake

This improved brake equipment increases operating safety because it affords the same degree of retarding force on loaded cars as on empty cars—automatically.

It reduces delays because the capacity to stop quicker prevents cars from being crowded out of position in traffic lanes by other vehicles.

It stimulates better schedules because the consistently short stops allow longer peak speed operation before deceleration begins.

Twenty-five prominent traction properties are now utilizing the advantages accruing from Westinghouse Variable Load Brakes to improve their transportation service.

The Variable Load Brake automatically adjusts brake cylinder pressure as the car weight changes to provide the same retarding effect throughout the range of passenger loading.

> WESTINGHOUSE TRACTION BRAKE CO. General Office and Works, Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES

Install Economy

Economy Electric Railway Meters

Electric Railways in over 200 cities have cut the consumption of energy 10 to 20% through the use of Economy Railway Watthour Meters.

Because the operators are continually stimulated toward correct car operation—The Economy Meter is a welcome tool which assists each man to improve by giving him a measure of his operating efficiency.

Economy Meters are easily installed and simple to maintain. Mercury-cushioned rotating parts insure their accuracy under railway and bus operation.



Besides Saving Your Power

the Economy Inspection Dials provide a method which accurately and automatically shows when car inspection is needed. They also show at a glance how much work a car can do before inspection is needed, and in case of a road failure, how much work the car has done previous to the failure. All this without any clerical labor.

ELECTRIC Meters GASOLINE Meters

—the first step to Saving

Economy Gasoline Vehicle Meters

fill the same need in motor transportation that the Electric Meter does in electric transportation..

They give an accurate record of energy costs.

Energy for automotive equipment is measured in gallons of fuel per mile. Hence the need for an accurate device for recording fuel as it is used.

The meter is designed for mounting on the dash or on a bracket and is easily connected in the fuel line between the supply tank and the vacuum tank.

The amount of fuel used is recorded in gallons and tenths of gallons. From these records the management can determine whether waste is due to faulty driving or poor condition of equipment.

You will begin to see a real saving in gasoline when you meter it as used.



Economy Electric Devices Company

37 W. Van Buren St., Chicago

Cable Address: Sangamo, Chicago

General Sales Agents
Sangamo Economy Watthour Meters
Economy Gasoline Vehicle Meters

District Agents for

Haskelite and Plymetl Woods Fare Boxes Peter Smith Heaters Bemis Boyerized Truck Specialties

METER THE ENERGY—THAT'S WHAT YOU WANT TO SAVE

CENTERTON 3:30



TO hold public favor buses must run I on time. Should starting, lighting or ignition fall down . . . crash goes the schedule . . . service is slowed up . . . passengers irritated. It may be the fault of the electrical equipment, but the bus

That is why the leading manufacturers listed below demand electrical equipment of unfailing dependability. That is why they choose North East. They know that the staunchness of North East equipment with its superior voltage regulation insures reliable service and low maintenance costs.

North East Equipped

- 10 1 F		
Graham Brothers	Reo	Mack
Yellow Coach	White	Six Wheeler
Versare	Diamond T	Dodge Brothers
Paige	Delage	Renault
Berliet	Franklin	Sterling Marine
Cottin-Desgouttes	Donnet	Negant Freres
Sizaire Freres	Gilford	Th. Schneider

—and others of high standing—

NORTH EAST ELECTRIC CO.

Manufacturers of Automotive Equipment Manujacturers of Automotive Equipment and Electrical Appliances
Starters .. Generators .. Ignition .. Horns
Speedometers .. Fract. HP Motors
Electric Drives for Typewriters Rochester, N. Y.

The Equipment That Lasts

NORTH EAST SERVICE INC.

Official Service and Sales Distribution For NORTH EAST Products Rochester · Atlanta · Chicago · Detroit Kansas City · New York · San Francisco London · Paris · Toronto Authorized Service Stations the world over

BASE

Your 1928 Track Program on

The DIFFERENTIAL METHOD

In Making Your Estimates for 1928, You Will Find

That the DIFFERENTIAL METHOD will cut down the time required for the job.

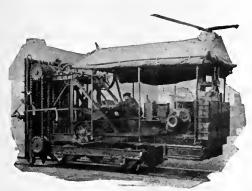
That the DIFFERENTIAL METHOD will insure you against costly accidents.

That the DIFFERENTIAL METHOD will cut down your cost of construction.

Many track estimates based on the Differential Method have shown such a large saving over old Methods that the entire cost of the Differential Equipment could have been properly charged off over the single season's operation.

DIFFERENTIAL EQUIPMENT IS ILLUSTRATED BELOW

The Appearance of this Equipment on Your Streets Would Favorably Affect Your Public Relations.



Clark Concrete Breaker



Differential Electric Locomolive Crane Car



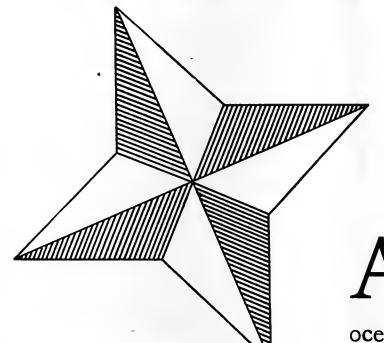
Differential Electric Dump Car



Differential Body 3-Way Dump

THE DIFFERENTIAL STEEL CAR COMPANY, FINDLAY, OHIO, U. S. A.

Opportunity grabs



A way over three thousand miles of ocean. And immediately our old friends the

General Public are all excited about aviation. So much so that capital is found to finance dozens of airplane exploitation companies almost overnight.

The General Public, then, has not lost interest in the progress of transportation. It is in fact more interested in this matter than ever before.

What of it? Simply this, that we have in the modern electric car what

a sledgehammer!

is really a marvel of science and engineering. A forward-looking viewpoint, sound salesmanship, and some of the faith that encourages real development, are all that we need to place it in its rightful position as LEADER,—not trailer,—of tomorrow's transportation facilities.

The transportation market is actually wide open now. Opportunity is reaching for a sledgehammer!

The Four Features of Balanced Design are the Cardinal Points of today's demand

CINCINNATI BALANCED CARS

—still a step ahead of the modern trend



The Name Which Comes Most Naturally to Mind

When seeking greatest permanence, economy and satisfaction in rubber insulated wire and cable, the name of OKONITE comes first to mind. The same applies to splicing materials— to flexible cord— to varnished cambric cables— to impregnated paper cables— to all other products in this well-known family—and why?

Perhaps it is the word of engineers who, for half a century, have acknowledged OKONITE as their quality standard. Perhaps, again, it is your knowledge of the methods used in our manufacture—the *only* information which can possibly explain the performance of these products—the only methods which could possibly achieve such high and unvarying quality.*





*NOTE — the most important of these methods will be described in subsequent advertisements.

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories: PASSAIC, N. J.

PATERSON, N. J.

SALES OFFICES: NEW YORK BIRMINGHAM SA

RK CHICAGO SAN FRANCISCO PITTSBURGH

ST. LOUIS ATLANTA

Pettingell-Andrews Co., Boston, Mass.

FRANCISCO LOS ANGELES

SEATTLE

F. D. Lawrence Elec. Co., Cincinnati, O.

Novelty Electric Co., Philadelphia, Pa.

Canadian Representatives: Engineering Materials Limited, Montreal Cuban Representatives: Victor G. Mendoza Co., Havana



OKONITE PRODUCTS

OKONITE INSULATED WIRES AND CABLES MANSON AND DUNDEE FRICTION TAPES OKONITE INSULATING TAPE

VARNISHED CAMBRIC CABLES OKONITE CEMENT OKOCORD OKOLOOM

OKONITE—CALLENDER PRODUCTS

IMPREGNATED PAPER CABLES

SUPERTENSION CABLES

SPLICING MATERIALS

3

This is No. 3 of a series on poved track design with STEEL TWIN TIES as used in over 45% of the cities of over 200,000 population in the United States. No. 4 will appear in an early issue.

9 9 8 8 9 8

720757307





TODAY

No. 2 Boston

No. 3 Detroit

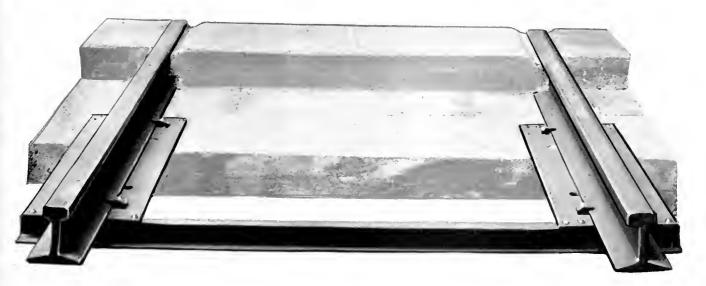
No. 4 Philadelphia

No. 5 Kansas City

No. 6 Cleveland

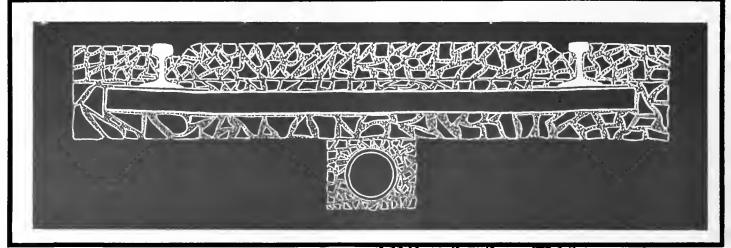
No. 7 Washington

No. 8 Buffalo









STEEL TWIN TIES are furnished to Detroit with ends bent upward to cant the rail 1 in 25, and are punched for 100 lb. ARA type A rail. The rails are Thermit welded and the track is paved with compressed concrete paving, which is rolled and grouted in after completion of construction up to base of rail. Detroit has about 100 miles of this design.

Complete detailed drawings and specifications will be sent on request.

Engineers of The International Steel Tie Company have played no small part in the design of better, more lasting track. We have in our files a fund of data on paved track construction that is at your disposal. We will be pleased to discuss with you your paved track problems, and to help you start your modernization program right. Steel Twin Ties are the first step toward better service, and lower initial and maintenance costs.

The International Steel Tie Co. Cleveland, Ohio



TWIN TIES ARE ALL STEEL





The Hyatt Roller Bearing — Railway Type. Solid inner and outer races with dual roller assemblies, all made from the finest Alloy Steel, specially heat treated to produce the highest degree of toughness, and to give the utmost of durability and dependability.

Note the helically wound rollers—a distinctive feature. Due to their microscopic flexure under load they nullify shocks and strains and assure remarkably long bearing life.

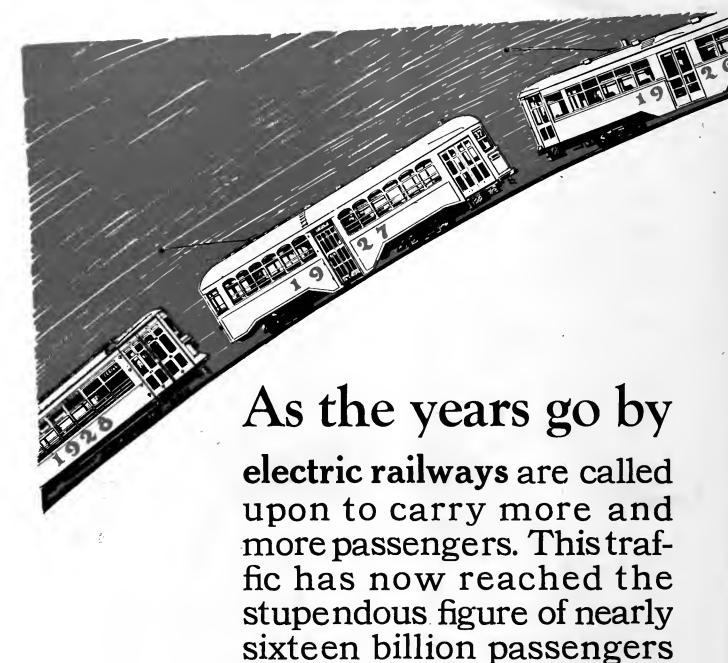
Existing equipment can be readily and effectively modernized by the adoption of Hyatt Roller Bearing Journal Boxes. The resulting economies of power and lubricant are decidedly worth while.

Peak load demands, the basis for establishing power rates, are considerably lowered when Hyatt equipped journal boxes are employed.

HYATT ROLLER BEARING COMPANY
Newark Chicago Detroit Pittsburgh Oakland

FOLLER BEARINGS

PRODUCT OF GENERAL MOTORS



a year.

With so large an increase it is necessary to employ the most modern and efficient loading and unloading methods. The "Circulating Load", operated through the medium of National Pneumatic Door and Step Equipment, has filled this need in a most satisfactory manner.

The "Circulating Load" gains in favor

To provide for "Circulating Load" in all types of service, the National Pneumatic Automatic Treadle Exit Door has proved a safe, quick and economical method of handling increased traffic.

Each year, therefore, brings a substantial increase in the number of treadle installations and there are now more than 5,000 of these doors installed upon approximately 3,000 cars and operated in nearly 100 different cities.



NATIONAL PNEUMATIC

RAHWAY, NEW JERSEY



K

Safe Speed



Speed alone depends on motive power. Safe speed depends on brakes, etc. The power to stop must always exceed the power to go, and developments in brake equipment and the brake shoe are, therefore, of prime importance. American Brake Shoes have fully anticipated these requirements. Their scientific reinforcement and their uniform high friction have made it safe to operate at high speed.

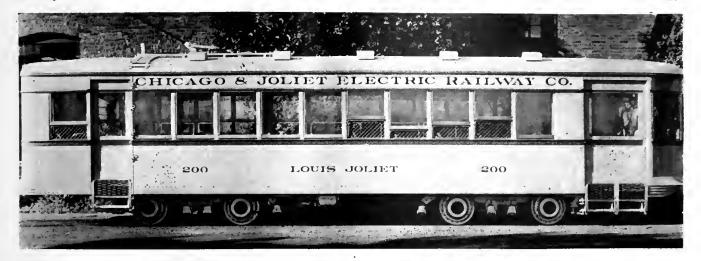


"Best by Test"

THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY

30 CHURCH ST., NEW YORK 332 SO. MICH. AVE., CHICAGO







Keeping Abreast of the Times in Modern Car Design

One of the outstanding developments in car design in 1927 is represented here in the "Louis Joliet All-Aluminum Car."

It typifies the trend in modernizing rolling stock. Comfortable seating, improved riding qualities and attractive design are features that definitely benefit operators through public good will and in increased revenue. The light weight

and improved mechanical construction brings a marked saving in operating costs.

By keeping in close touch with every new demand in transportation, Cummings Car & Coach Co. is eminently fitted to build all types of rolling stock.



CUMMINGS CAR AND COACH CO.

111 W. Monroe St. Chicago, Ill.

WINDOWS D OMAKE DIFFERENCE

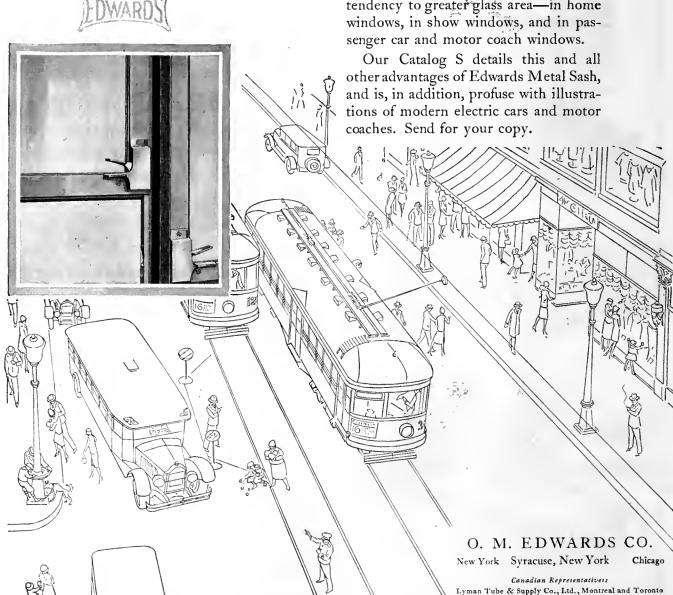
A mark of modern construction

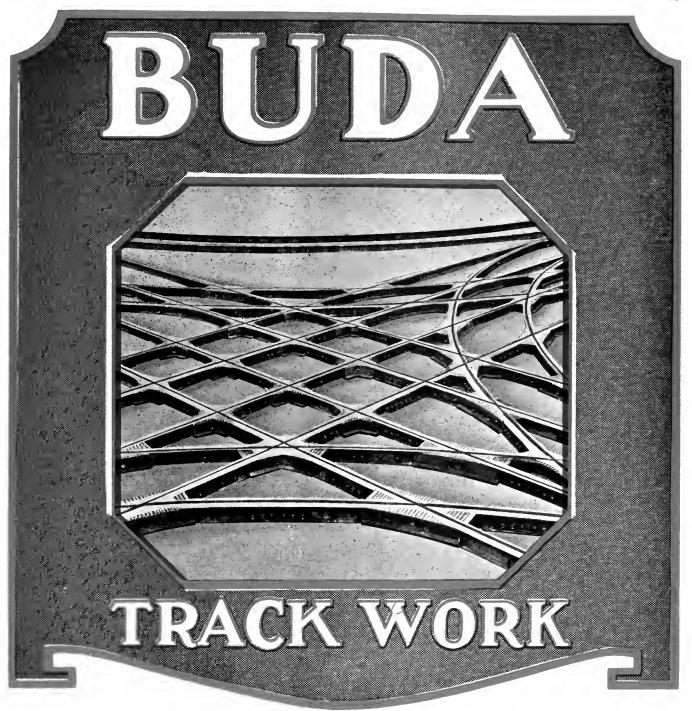
Italwards Metal Sash

I'vears, we have seen in the forty years, we have seen many improvements in the windows of passenger cars on both steam and electric railways.

In fact, we have pioneered in most of these improvements.

Edwards Metal Sash is a striking advance, in full keeping with the modern tendency to greater glass area-in home



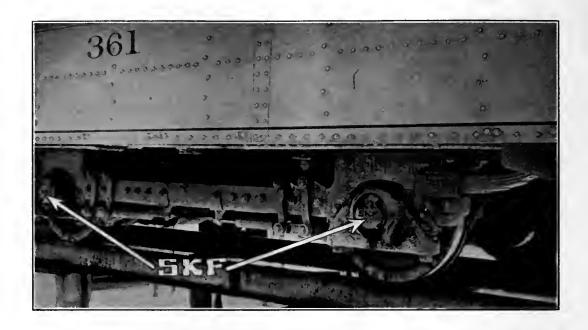


Quality and service built up through forty-seven years' experience in building trackwork is a guarantee of excellent performance that you receive when you specify Buda track work.

BUDA COMPANY
Harvey Illinois

Nothing is apt to cost so much as a bearing that cost so little

You men who plan, build, use or pay for machines of any kind, remember this: It costs more to replace a poor bearing than to buy the best one that BESF ever produced. And BESF Anti-Friction Bearings are the highest priced in the world.



Throughout the World Easy Riding and Operating Economies Are Insured with 5 KF

RUGGEDNESS and low mainternance are two outstanding features of SEF Journal Bearings which have been proven conclusively in street railway service. Then, too, these bearings with their smooth and easy running qualities make a marked difference in the operation of equipment. This is especially noticeable on rough and uneven track.

With traction companies concentrating today on more efficient operation with a safe margin of profit, the economic importance of BESF Journal Bearings cannot be overlooked. These bearings are not an experiment, for more than 23,000 journals on 35 steam and electric roads in this country and on the roads of 21 countries abroad are ESF equipped.

5KF INDUSTRIES, INCORPORATED, 40 East 34th Street, New York

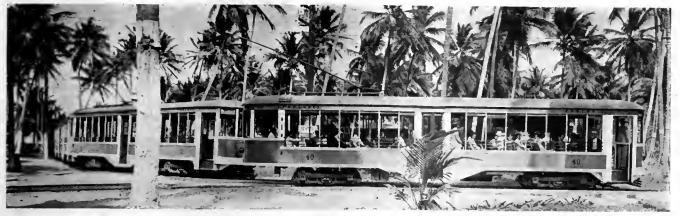
SKF

Ball Bearings



Roller Bearings

1962



The new cars are comfortable and attractive. They replaced antiquated equipment that repelled riders

Revenue Doubled in one year with

"Thomas-Built" Cars

One of the most astounding stories ever published of how a street railway company "came back" with a vengeance, appeared in *Electric Railway Journal*, December 31, 1927. It was about the Porto Rico Railway, and was written by Mr. Frederick Krug, General Manager.

In his own words:

of passengers carried and the doubling of its passenger revenue in a period of one year have been the result of improvements introduced on the street railway system of the Porto Rico Railway, Light & Power Company, San Juan, P. R. Four factors have contributed to the attainment of this result: First, the purchase of six new steel cars, modern in every respect and specially designed for tropical service, and the complete rehabilitation of the best five of 35 old cars; second, extensive overhauling and improvements to track and roadbed; third, speedier and more reliable service by the substitution of a loop operation for the former single-track service with turnouts and

delays in the residential district, and, fourth, advertising and publicity.

And now read what he says about the cars and what they did:

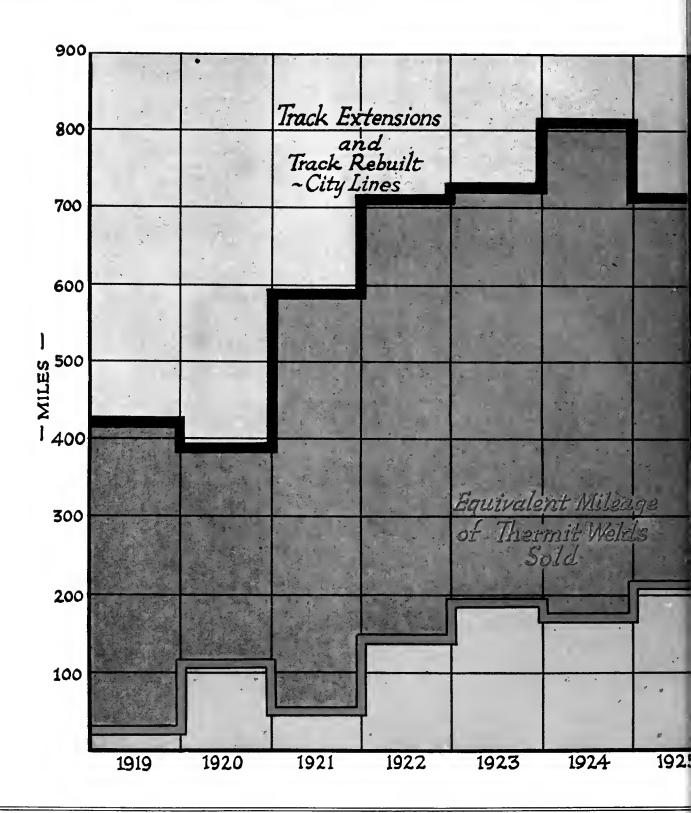
66 An order was placed for six new light-weight, steel, four-motor, single-end cars, with a seating capacity of 57 and a total weight of only 30,000 lb. These six cars were placed in service last spring and have been running for eighteen hours a day since their arrival. With their bright and cheerful coloring of yellow and white, contrasted to the barn red on the old cars, the new cars met with instant public favor. The leather-upholstered seats in place of wooden seats on the old cars, their practically noiseless operation and the cheerful interiors all contributed to their immediate success.

This system had staggered along for years with antiquated equipment. Let "Thomas-Built" Cars help increase your revenue—as they did here and are doing for so many other railways.

PERLEY A. THOMAS CAR WORKS

High Point, N. C.

65% Thermit in 1927



METAL &

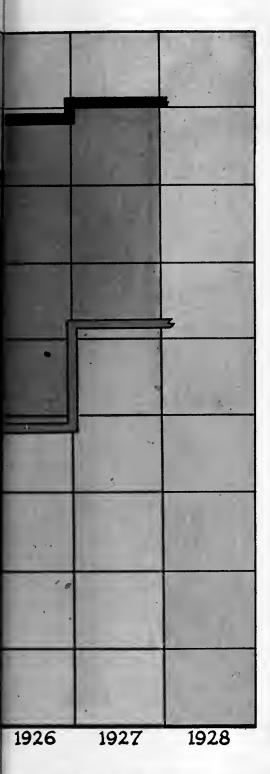


CHICAGO

BOSTON

BROADWAY

Statistics disclose its increasing popularity



OOK at the chart! It shows the use of Thermit Welds compared with the total city-line miles of new track extensions and track rebuilt.

Look at the 1927 figures! During the past year sufficient Thermit Welds were sold in the United States to build or rebuild over 500 miles of track. The total of new track extensions and track rebuilt in city service was approximately 800 miles, as estimated from early returns for the 1927 statistics. Enough Thermit material was sold to weld about 65% of this total city track mileage built or rebuilt in 1927 throughout this Country.

Surely no further evidence of the increasing popularity and economy of Thermit is necessary!

Wherever rail ends are cupped, angle bars worn and bent, and the paving in bad shape at joints -Thermit Welding is the remedy. It costs no more, but gives a far superior result. Try it! You will obtain these advantages also:

Prolongs the life of track Reduces depreciation of cars Saves paving around joints Lighter rail can be used No electrical bonding -and the first cost is the last cost!



CORPORATION NEW YORK, N.Y.

SOUTH SAN FRANCISCO

TORONTO



There's new activity in the Electric Railway Industry. New equipment in startling amount is everywhere evident. Progress is the watchword and Elreco has been one of the torch bearers.

We anticipated the day when finer appearance, greater adaptability, lighter weight, reduced installation and maintenance cost would be demanded.

Today Elreco Tubular Steel Poles are replacing unsightly wooden ones. A single Elreco carries trolley wires, lighting wires and lighting units. Now three or four companies use the same pole. The cost to each is minimized.

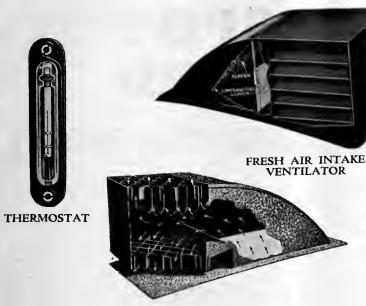
Forward looking Public Utility Companies in more than two hundred cities and towns have taken advantage of Elreco economy. Are you one of them? If not get in touch with us today. There's a story back of Elreco you should know.



The Electric Railway Equipment Co.

2900 Cormany Avenue, Cincinnati, Ohio

30 Church St., New York City





Passenger Comfort that means revenue

Insuring the comfort of the riding public means revenue. That is why there are more than 26,000 cars in the United States and Canada equipped with Railway Utility Heat Regulating and Ventilating devices.

It is why cities throughout the country are turning to this equipment as a big factor in building up greater revenue.

Utility Car Heating and Ventilating Devices represent the farthest advance made in this line of endeavor. Utility heaters can be employed without any



CROSS SEAT HEATER

danger from overheating. They are proof against vibration, overloads, dust, dirt and moisture.

So satisfactory have Railway Utility Heating and Ventilating devices proven to be that they are now standard for many railway properties. It will be to your advantage to get detailed information.

RAILWAY UTILITY COMPANY

CHICAGO, ILLINOIS

SAMSON SPOT TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

When a detail like trolley cord can so easily cause expensive service interruptions it is better to take no chances Samson Spot Cord actually costs very little more than the cheap stuff and is always an economy in the end—

Samson Spot Cord is thoroughly Waterproof. It will not shrink, kink, or swell to jam the catchers. It is smoothly braided, pliable, uniform in thickness, and guaranteed free from rough places or imperfections. In short it is a real trolley cord, designed for this purpose and made to wear "like iron."

Samples on request.



You can buy Samson Bell and Register Cord with absolute assurance that it is of the same high quality and manufactured with the same care as Samson Spot Trolley Cord. Its neat appearance and finish match the finest of car interiors. It resists abrasion. Can be sup-

plied in any reasonable size or length, in white, mahogany or drab—other colors to order.

Samson Signal Cord with galvanized wire enter is made in mahogany color, sizes No. 6 and No. 8.

SAMSON CORDAGE WORKS

88 BROAD STREET



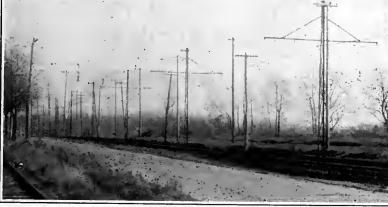
BOSTON, MASS.

MARK

Bates Truss Poles

For Trolley Suspension
Are Features of the
Erie Railways
Improved
Double Track
Installation





Views showing completed improvement of Eric Rallway right-of-way, a twotrack line in the center of a 120-ft, roadway. Single expanded Bates-Tross Poles have been need

BATES-TRUSS is the up-to-date solution to modern electric rail way pole problems. A convincing number of recent improvements have specified Bates-Truss poles or overhead structures for their right-of-way. Among the most recently featured was that of the Erie Railway of Erie, Pa. An arrangement of single poles with a double trolley suspension bracket was adopted. The structural simplicity of the Bates-Truss pole combines lasting strength with a fine appearance that will meet any civic improvement standards.

Bates-Truss for all forms of overhead construction

INTERNATIONAL
STANDARD ELECTRIC CORP.

General Export Distributors

SAMUEL BROWN, LTD., New Zealand JOST ENGINEERING CO., LTD., India



157,640 CAR MILES in the Most Severe Service



And without ONCE opening the Motor



THIS Westinghouse 508A Railway Motor operated over the lines of the Houston Electric Company (Houston, Texas), from September 1924 to September 1927, with a total mileage of 157,640 miles, without once being opened for inspection. Its shaft is carried on two Hoffmann Standard Precision Roller Bearings, with one Hoffmann Ball Bearing for endwise location. This is a typical example of Hoffmann Dependability.

NORMA-HOFFMANN BEARINGS CORP'N Stamford, Conn., U.S.A.

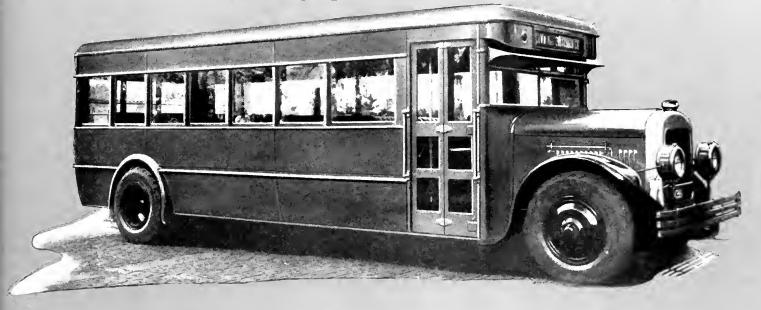
HOFFMANN"

PRECISION

ROLLER BEARINGS

G-E CONTRIBUTIONS TO THE RAILWAY INDUSTRY IN 1927

Taking advantage of Gas-electrics_



EVERYWHERE in the field of transportation, the advantages of the gas-electric bus are becoming more and more evident—both as a means of improved public service and as a source of added revenue.

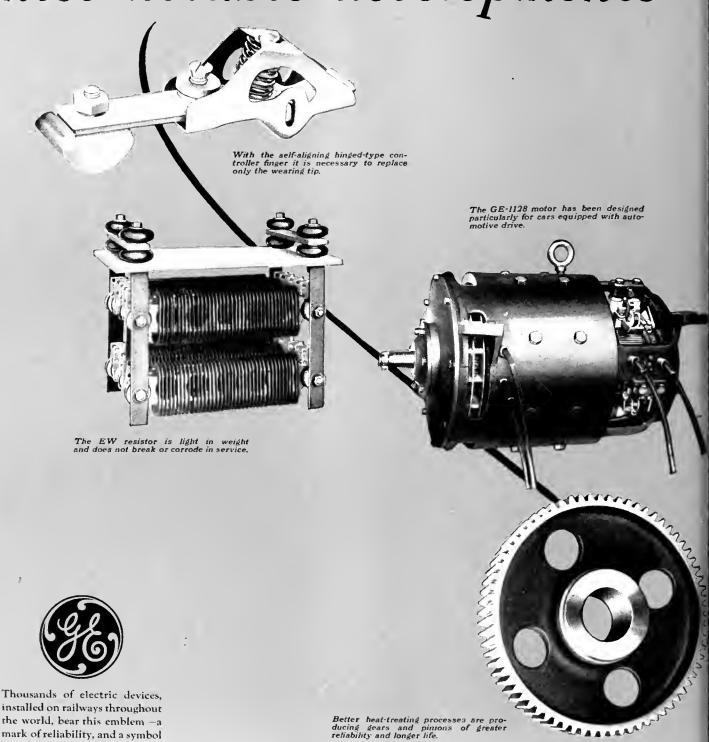
Last year, many operators adopted G-E equipped gaselectrics or added to their existing fleets. One company, alone, put into service 107 new G-E equipped gaselectric buses.

Such instances are impressive evidence of the favor with which these buses are being received by both the operating companies and the public.



GENERAL ELECTRIC

These notable developments

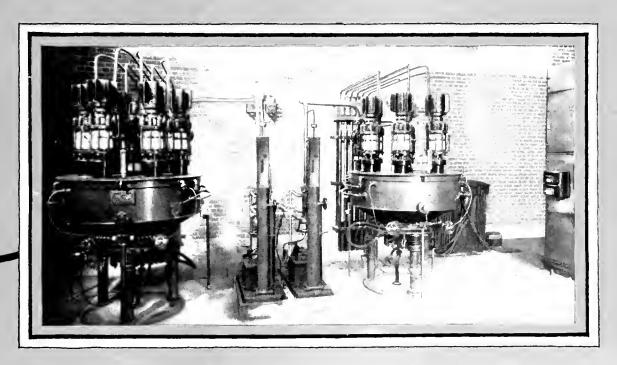


GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

of service.

have improved operations

General Electric's contributions to the rail-ways have resulted in better and more economical operation. Among the many developments made by General Electric during the last year are automatic substations and mercury-arc rectifiers of improved design; the self-aligning hinged-type finger; the light-weight, non-corrodible Type EW resistor; the improved GE-265 railway motor; the new GE-1128 motor for cars equipped with automotive drive; and gears and pinions of greater strength and longer life.



Mercury-arc rectifiers are delivering power unfailingly to many progressive roads.

ELECTRIC



check with this man





a complete listing of the following G-E insulating materials. Write for it.

Insulating Varnishes
Finishing Varnishes
Insulating Oils
Stickers
Shellacs
Paints
Filling Compounds
Sealing Compounds
Varnish Treated Cloths
Varnish Treated Cloth Tapes
Insulating Fibers
Insulating Papers
Flexible Varnished Tubing
Motor Tubing
Asbestos and Cotton Tapes
Friction and Rubber Tapes
Prepared Paper Tapes
Cords and Twines

Write to
GENERAL ELECTRIC COMPANY
Merchandise Department,
Bridgeport, Connecticut.

Ask the shop foreman how often repaired motors come back. If maintenance is high—look to the insulation.

General Electric developed its insulating materials to obtain *continued protection* for G-E railway motors and other apparatus. They are repair materials of original equipment quality. Can you afford to risk anything less reliable?

There is a complete line for every purpose. The more popular General Electric varnishes are:

No. 460-Black Baking
No. 450-Clear Baking
No. 457-Black Air Drying

Available in pints, quarts, 1-, 2-, and 5-gallon cans, and in 55-gallon drums.

PROMPT SERVICE

You obtain better service because G-E insulating materials are sold only through ONE source—the G-E Merchandise Distributor. This assures you a shipping point near at hand, complete stocks, speedy deliveries, and convenience in ordering.

Insulating Materials

GENERAL ELECTRIC

MERCHANDISE DEPARTMENT, BRIDGEPORT, CONNECTICUT

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review Published by McGraw-Hill Publishing Company. Inc.

CHARLES GORDON, Editor

Volume 71

New York, Saturday, January 14, 1928

Number 2

Persistent Improvement

Is the Price of Success

NOTHER year of readjustment has just closed for electric railways. Much progress has been made in meeting changed conditions by revamping and readjusting outworn methods and facilities. But in no instance have all the possibilities for improvement been exhausted. Those managements which have gone forward courageously have made the greatest progress. They see the most work still to be done and express the most optimistic outlook for the future.

Despite the interest taken throughout the country in improving the character of cars operated by electric railways, actual buying of new cars has lagged. Development in design, on the other hand, has attracted widespread attention. At the Cleveland convention it was clearly manifest that the industry became thoroughly aroused during 1927 to the importance of developing cars that can compete successfully with the automobile. The exhibits included many body, truck and equipment ideas that represented long steps forward in a single year. It seems evident, therefore, that the number of new cars built in 1928 will probably depend to a considerable extent on the speed with which the development work is carried to fruition and the degree of success achieved by some of the newer types of design. If these designs are successful in meeting the competition of the automobile, this may be expected not only to release pending orders for new cars, but also to interest many properties which still are inclined to cling to obsolete equipment.

TRACK reconstruction was unusually active during 1927. This was a continuation of the increased activity shown in 1926. Electric railways have come to see that they face the alternative of putting track in first-class operating condition or, if

the density of traffic does not justify the expenditure for track reconstruction work, of abandoning it altogether and substituting buses. The mere fact of the widespread investment which is being made in track reconstruction is ample evidence of confidence in the future of rail transportation.

BUS operation by electric railways is expanding steadily, though undergoing some readjustment and experimentation to determine the proper relation between the new vehicle and existing transportation lines. That relation rapidly is becoming clearer, with marked trends toward certain types of vehicles and classes of operations. A sharper line is being drawn between the operation of buses as street cars on rubber tires; that is, as substitutes for cars, as feeders, cross-town connections or extensions, and the use of buses to give service of a class distinctly different from that of the low-priced rail ride. All signs indicate that bus operation by electric railways may be expected to maintain a healthy rate of increase.

As the industry faces a new year, the general question of the moment again is, "What does the future hold in store?" There is less of desperate demand in the question today than at any other time during the past several years. No longer is the issue one of life and death for the industry. Assured of the fundamental need for public transportation, electric railways can contemplate the future with confidence. But though the outlook has improved, to be content merely to drift into the future would be the height of folly. Real progress is achieved only by keeping a sharp lookout. The opportunity exists for winning greater success than ever—but only by persisting in the application of initiative and ingenuity to meet changed conditions.

Track Reconstruction in 1927 Largest in Many Years

CONFIDENCE in the future of electric railway transportation is indicated by the record-breaking amount of track reconstruction during 1927. Approximately 900 miles of track was rebuilt, of which 700 miles was city track and 200 miles was interurban. This total exceeded the 1926 figure by about 100 miles and topped the previous high record of 1923 by approximately 50 miles. It is about 60 per cent above the average of the past ten years. Activity in city track construction accounts for the increase. The mileage of interurban track rebuilt was substantially the same as in 1926 and well above the average of recent years.

Track extensions made during the year just ended, including steam railroad electrifications, totaled slightly more than 330 miles, or considerably less than those made in 1926. This is a little below the average for recent years. It is noteworthy, however, that electric railway track additions made since Jan. 1, 1917, total more than 4,000 miles. Since more than 3,000 miles of bus routes were added by electric railways during the past twelve months, it seems natural that only a moderate amount of

new track is being built.

Ten electric railways ceased operation altogether during 1927. Of this number six were local lines, averaging about 7 miles in length, and four were interurbans, with an average of about 30 miles of track apiece. Bus service was substituted under the same management in two instances and under different management in five instances. No transportation is now being furnished in the territory formerly served by the other three railways. On railways which continued to operate the major portions of their systems buses replaced some 450 miles of car service in 1927. The amount of this replacement was considerably larger than in 1926. Nevertheless, the combined total of partial and entire abandonments in 1927 represented only a little over 1 per cent of the track mileage of the industry. It should be remembered, too, that this was largely offset by the additions to electrified mileage.

Summarizing the gains and losses in the past decade, it is found that the total additions are substantially greater than the total abandonments. Moreover, some 19,000 miles of bus routes have been added during this period, so that the present combined track and bus mileage is far in excess of the pre-war mileage.

Bus Operation Expanding Along Sound Lines

STEADY increase in the bus operations of electric railways occurred during the past year. The rate of growth was approximately the same as in 1926. The number of buses increased about 20 per cent, as did the route mileage. The number of bus-operating railways also showed a substantial increase. Purchases of buses were only a little less than in the preceding year. From this it is evident that a healthy condition exists and that the expansion of electric railway bus operations is steady and sound.

Several significant developments in bus design occurred last year. Foremost among these was the trend toward smaller, lighter and more luxurious vehicles, approaching the private automobile in the character of service rendered. The number of de luxe buses bought was larger than in previous years, and the average seating

capacity was somewhat lower. It was notable that companies which had previously started de luxe service at a higher fare purchased more vehicles to extend this service.

On the other hand, new single-deck designs were brought out last year with unusually large seating capacity. Purchases of this type of equipment, while not in large volume, were scattered over a number of properties. That large seating capacity alone is not the only requirement for successful bus operation is indicated by the waning popularity of double-deck buses. The number bought in 1927 was less than for several years past. Judging from this it appears that the general trend is toward the operation of smaller high-grade vehicles suitable for giving a preferred type of service at substantially higher rates of fare.

The extent to which bus service replaced rail service in 1927 was somewhat greater than in 1926. The mileage of such replacements, however, was only one-fifth of the total mileage of bus route extensions. Thus it is again shown that the bus finds its greatest usefulness as an additional and supplemental part of the local trans-

portation systems.

The Need for Ignoring Tradition Is Greater Than Ever Before

EVIDENCE is available on all sides of the progress which the electric railways are making. It is no small accomplishment to have secured fare readjustments that have put much of the nation's mileage on a 10-cent fare basis, to have brought about co-ordination of buses on the present scale, to have secured widespread recognition by a former monopoly business of the need for merchandising and modernizing, to have obtained passage of paving relief measures and to have done the other things of which there is record.

Properties like those of Chicago, Pittsburgh, Atlanta, Richmond and Grand Rapids and some of the revamped interurbans, where it was necessary to resort to physical and financial rehabilitation, are doing well, but the full effect of the heroic changes to which many roads have

resorted has only begun to be reaped.

Certainly the situation with respect to receiverships has been materially bettered. The Chicago Railways is the only large city system under the jurisdiction of the court. This is attributable entirely to delay in working out a satisfactory franchise. Although the principal of the bonds is in default, interest is being paid and there is no complaint on the score of earnings of the property. The total amount of bonds in default for the industry still looms large, but there is a strong current of underlying improvement in conditions and the capitalization of property after property is being brought to a sound earning basis. So far as the interurbans are concerned only two large properties of this kind remain under court jurisdiction.

Individual properties have been slow to take advantage of the recommendations of the finance committee of 1925, which suggested voluntary readjustment of finances. But that matter is a live topic again. Voluntary readjustment looking toward the scaling down of fixed charges on existing securities is a process that is not easy of accomplishment, but it offers attractive possibilities to the owners of existing securities for enhancement in the value of their investment through permitting the property to finance needed improvements on reasonable terms. The Grand Rapids Railway was able

to simplify its financial structure, and the Pittsburgh Railways is still at work on the effort to consolidate the debts of the companies which go to make up that system. At least one other readjustment of large proportions is under way, but the matter is not far enough along to refer to it specifically.

The present is a particularly propitious time for financial housecleaning since money rates are very low. That the railways which borrowed this year did so at rates advantageous to themselves is attested by the record of financing elsewhere in this issue. The operation of the Twin City Rapid Transit Company in arranging a loan of \$18,000,000, secured by a lien under which bonds were sold to yield investors 5.70 per cent, is an instance of a strong company which took advantage of a favorable money market to provide for its future cash needs and to anticipate obligations that do not mature for some months. But it is the small and medium sized companies that need particularly to be nurtured. Something may come of discussions which look toward a plan to make new equipment available to them under a car trust.

An industry has won half the battle which has diagnosed its problems as clearly as have the electric railways, but the need for keeping everlastingly at the work in hand is more insistent than ever. The electric railways will achieve their ends only as they are actuated by the determination to meet changed conditions for which there seems to be no parallel in industrial history. It is difficult to break down the barriers of the past, but the need is greater than ever for ignoring tradition.

Budgets for 1928 Show Confidence

CONTINUED faith in the local transportation industry is shown by the budgets prepared by the various companies for the present year as compared with those of a year ago. Large expenditures are planned for capital account in 1928. It is significant that the biggest increase is for way and structures, indicating that those who control the properties are satisfied that rail transportation will continue for a great many years. Country-wide estimates indicate that the electric railway companies will spend \$246,142,000 for new plant and equipment and maintenance materials during the year. This is greater than the amount spent in 1926 or 1927 for similar items. Contrasted with last year, it is 9.27 per cent higher.

Capital expenditures for track are estimated at \$89,677,000, which is by far the largest amount estimated since this paper has been presenting budget figures for the industry. Compared with the average expenditures for 1924, 1925 and 1926, it is 70 per cent greater. This is the more remarkable since the money spent on track reconstruction in 1927 was almost 50 per cent more than the three-year average. It is an indication that there is little further tendency to defer trackwork because some other mode may render rail transportation obsolete. Proposed expenditures for cars, \$35,495,000, are slightly greater than for 1927. This is considerably less than the average of the years 1924-26. Indicated bus purchases are also slightly higher than for 1927, although the size of the market for buses has changed but little for the past four years.

Purchases of maintenance materials planned for this year show an increase in all items. While these are not large, there is every indication that the industry is preparing to take good care of its physical plant. In particular, the larger amounts spent for bus maintenance

last year and the estimated expenditures for this year indicate that since equipment of this type is all relatively new, and more and more buses are being added each year, the maximum of bus maintenance costs has not yet been reached.

The careful preparation by the companies of the figures from which these industry estimates were calculated shows increased interest by operators in annual industry budgets published by the JOURNAL. It also shows that electric railways are giving more attention to plans for the future. But it is far more significant that the actual figures for planned expenditures indicate a growing confidence in the stability of the industry and in the continued need for efficient local transportation.

Car Situation Demands Earnest Attention

WHEN analyzed from the standpoint of new rolling stock purchases, the year 1927 was a period of waiting. The value of speed, beauty, style and quiet operation of electric cars for stimulating increased riding was recognized in 1926 and substantial progress was made toward perfecting designs that would have increased rider appeal. Further refinements in car body construction and several radical changes in truck design were brought out at the beginning of 1927. These have undoubtedly had the effect of delaying purchases of needed rolling stock pending further experience with the experimental designs.

This delayed buying of cars cannot long continue. The industry must proceed with the replacement of obsolete equipment to meet the changed conditions of the day and to eliminate the excessive operating cost of old cars. Then there may be expected not only the active business of a normal year but also the increase due to the deficiency in car replacements during the past several years.

The number of passenger cars, 945, bought by electric railways during 1927 was the lowest for any single year in the records of the industry. In 1921, which previously was the low year, there were 1.188 passenger cars purchased. The total of all types of cars and electric locomotives for 1927 was brought above that for 1921 by the increased number of freight and dump cars bought. New city passenger cars in 1927 were 22 per cent less than for 1925 and 34 per cent less than for 1926. Interurban passenger cars bought in 1927 were 62 per cent less than in 1925 and 60 per cent less than in 1926.

Cars of the two-man type predominated in the orders for large cities. There were, however, 410 one-man or one-man, two-man cars reported. This constitutes 45.9 per cent of all the cars ordered for city service. Reduced weight was sought in every way possible. Several experimental cars were built in which aluminum was used largely in the construction, and light weight was a controlling feature in all the new truck designs. Low floor heights with small wheels and four-motor equipments were the rule for new city cars.

It is quite obvious that the entire car situation constitutes a problem of major importance. It is of gravest consequence to the industry and deserves the earnest attention both of operating and manufacturing executives. The primary motive back of all the new designs is to develop cars that will attract increased revenue. Manufacturers are therefore entitled to the fullest possible co-operation from the industry in this effort. Only with such co-operation may they be expected to carry through successfully this expensive development work.

Railway Operations Show Basic Improvement

Stabilization has followed the economic upset caused by the war, and improvement can be looked for in 1928. Industry statistics cover trends of revenues and expenses, as well as comparisons with other indices of business

ITAL changes that affect the electric railway industry have been under way ever since the beginning of the war. In fact, some of them had their inception before that time, although they had not become of great moment until the entire economic structure of the country was upset. However, at no time since this period of readjustment began have conditions been so thoroughly stabilized as during the past year. The industry has now adapted itself to the changed conditions and it is not to be anticipated that there will be any periods of doubt and uncertainty in the near future such as existed in the era the country has passed through.

Two major factors have exerted a profound influence on the local transportation industry. The first of these is the tremendous increase in costs of every kind, while the second is the advent of the passenger automobile as an active competitor. Other factors that have had a lesser influence are the general prosperity of the country and the trend of industrial employment.

The effects of these influences may be seen by a study of the charts accompanying this article. These were prepared originally by the American Electric Railway Association's statistical department, and were exhibited at the Cleveland convention last October. In co-operation with the association, these have been extended to include the latest available figures, so that the trends may be seen almost to the end of 1927.

PASSENGER TRAFFIC AND INDUSTRIAL EMPLOYMENT

Trends of passenger traffic and employment for the last three years are shown graphically in Chart I. The earlier portion of the chart is computed for 201 electric railway companies, while for the last five months of 1927 the number of companies varies somewhat, as slightly fewer of them turned in complete reports. The 201 companies operate 26,215 miles of single track and 6,277 miles of bus routes. The track represents 62 per cent of the total electric railway mileage in the country.

Frequently the assumption is made that the passenger traffic of local transportation systems follows the trend of industrial employment. In previous years this may have been true to a considerable extent. As seen in Chart I the peaks and valleys of employment in the earlier months have corresponded rather closely to the riding, although the summer drop in employment is considerably less pronounced than that in traffic.

General business conditions were somewhat less stable in 1927 than they were in 1926. The difference is evidenced in the reduced employment index for the past year, which was lower than for 1926 and also lower than for 1925, which was not so good a year as 1926. It is

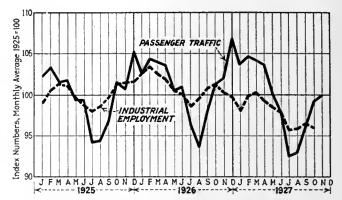


Chart I—Trend of passenger traffic and industrial employment for the years 1925, 1926 and 1927

The trend of passenger traffic was greater for the first quarter of 1927 than in 1926. Beginning in April, the index declined, but in August it again began to rise. The information was obtained by the American Electric Railway Association and the U. S. Bureau of Labor Statistics.

an encouraging sign to note that the riding during November and December, 1926, and in the first months of 1927 actually showed an increase, even though there was a drop in employment. Somewhat later in the year traffic fell off, but as the season advanced traffic has shown indications of coming back to normal, though employment continued to have a downward trend.

Many years ago the electric railways did their maximum business in the summer months. This was to a

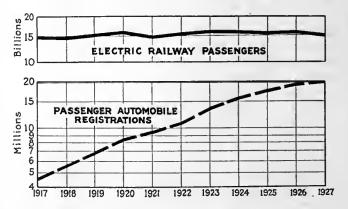
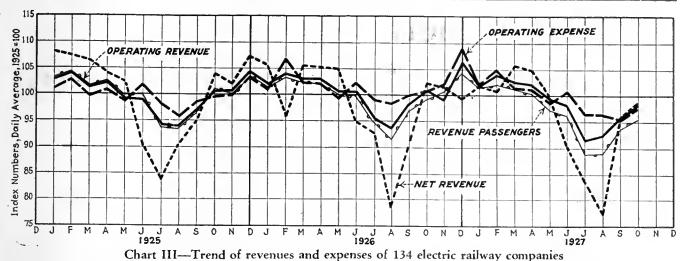
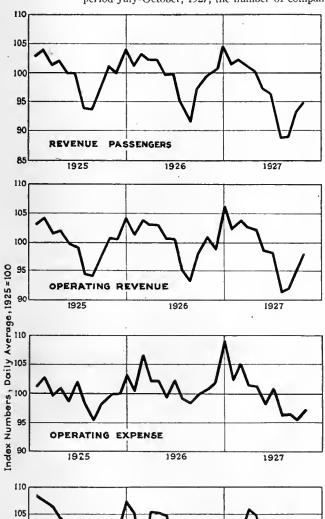


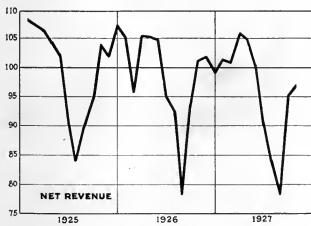
Chart II—Trends of electric railway traffic and passenger automobile registration during the past eleven years

Figures collected by the American Electric Railway Association and the National Automobile Chamber of Commerce show that though automobile registrations have experienced an enormous growth in the past decade they have not materially affected electric railway passenger traffic.



These curves, showing the variations through 1925-27, were prepared by the A.E.R.A. For the period July-October, 1927, the number of companies included is somewhat less than the above number.





considerable extent on account of the pleasure riding in the summer, as well as to the difficulty of providing reliable service under trying winter conditions. With the advent of the automobile there has been a gradual change in the character of the riding on public transportation systems, so that today there is a maximum amount of traffic during the winter months, with a lower amount of business in the summer. The pleasure riding being absent, there is a further reduction in summer because some patrons are on vacations, and many who depend on transportation service in bad weather walk when the streets are clear and the skies are bright. Also, automobiles are used to a greater extent in summer.

As the use of automobiles has increased there has been a change in the character of electric railway traffic which has given concern to many operators. The use of street cars for the wage earner to ride to and from work has gone up, while the incidental use of the cars for shopping and transient riding virtually has stood still. This has accentuated the peaks of traffic, so that while more cars have been needed to carry the peaks fewer are needed for the all-day riding.

Under conditions as they exist today, it is not possible to consider public transportation without taking into account the growth in magnitude of the private automobile as a competitor. As mentioned previously, the advent of this vehicle has had a profound effect on all public transportation methods. Chart II, which shows the relation between the number of electric railway passengers and the automobile registration by years, is of marked interest. It will be seen at a glance that while the number of antomobiles in use has grown by leaps and bounds it has not had any great effect in depressing the total demand for public transportation service. The upper portion of the chart shows total electric railway passengers for each year. There has been a practically constant number of riders throughout the period. In the meantime, the number of registrations of automobiles has increased from about 4,500,000 in 1917 to 20,140,000 in 1927, and beside this there has been a much greater use made of each automobile, as their design and relia-

Chart IV—A comparison of the trends of operating revenue, operating expense, net revenue and revenue passengers carried

The information is the same as that used in Chart III, separated for greater clearness. Seasonal variations in revenue passengers are reflected in the operating revenues and net income.

bility has improved. A striking illustration of the growth in automobile ownership is that while in 1917 there was about one auto to every 22 persons in the United States, in 1927 there was more than one to every six persons.

TREND OF OPERATIONS IN 1927

The trend of traffic revenues and expenses is shown in Chart III for a group of 134 properties, except for the months subsequent to June, 1927, for which the number of companies is somewhat less, as complete reports are not available. Similar information is shown plotted independently in Charts IV-a, b, c and d. The results for 1927 were slightly under those for the previous year, although the last few months indicate that conditions are improving.

As an indication of the efficiency with which public transportation is being furnished, the corresponding figures for the same group of roads have been plotted in Chart V on a car-mile basis. In general the operating revenue per car-mile is slightly higher in 1927 than it was in 1926. Operating expenses per car-mile, which reached a peak in December, 1926, have fallen almost steadily in 1927, so that toward the end of the year they were under the corresponding months for 1926. The net revenue per car-mile has increased because of the higher operating revenue and lowered expenses per car-mile.

It is quite noticeable that with the reduced traffic in the summer time expenses are not reduced proportionately, and the net revenue has a drop in this portion of the year out of all proportion. This may be accounted for by the necessity for providing a return on the fixed investment, as the net operating revenue per car-mile shows less fluctuation with the seasons than does the gross.

FARE SITUATION IS IMPROVED

The failure of fares to increase in proportion to the demands made on the companies is shown in Chart VI. There was a lag of about four years, 1913-1916 inclusive, when there was virtually no increase in fares, while

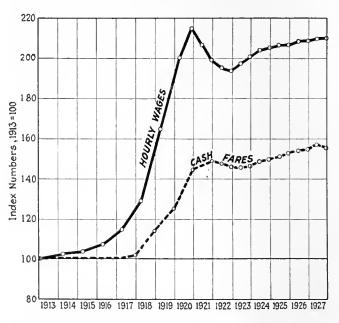


Chart VI—Relative increase in fares and wages in the United States

This comparison, made from information collected by the A.E.R.A., shows that wages have increased 110 per cent since 1913, while cash fares have advanced only 58 per cent.

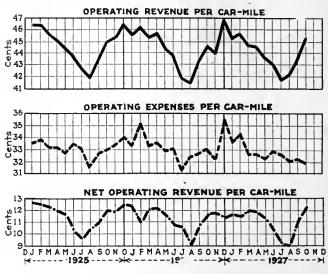


Chart V—Trends of operating revenue, operating expense and net operating revenue, in cents per car-mile

The trends are here plotted for the same group of companies as Charts III and IV. The information was prepared by the A.E.R.A.

wages had gone up nearly 20 per cent. As time went on the difference between wages and fares has become greater, so that today wages are about 110 per cent above the pre-war basis, while fares have gone up only some 55 per cent.

Rates of fare during the past eleven years are shown in Chart VII. It will be noted that in 1917 the 5-cent fare was all but universal, 273 companies out of a total of 303 companies charging 5 cents. There were five companies using zone fares and 25 with 6-cent fares, higher rates being unknown. The 7-cent and 8-cent fares appeared in 1918 and the 9-cent and 10-cent fares in 1919. Today the 10-cent fare is the most popular, 102 companies having this rate, while only 39 companies retain the old 5-cent fare.

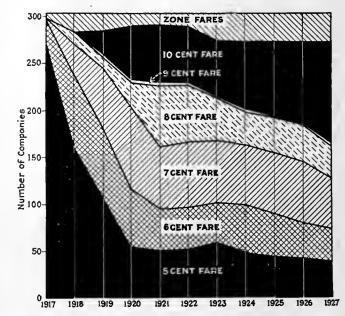


Chart VII—Distribution and trend of cash fares, 1917-1926

This chart, prepared by the A.E.R.A., shows the rapid decline in the use of the 5-cent fare and the corresponding increase in the 10-cent fare and other higher rates.

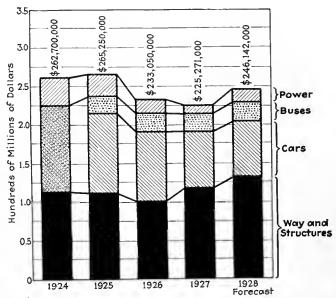
\$246,142,000 Expenditure

Planned for Plant and Materials in 1928

This figure, the largest for several years, follows a slight recession in 1927. Large expenditures for track construction in contemplation indicate confidence in rail transportation

BUDGETS of the electric railways show that more expenditures for plant and maintenance materials are contemplated for this year than for any year since 1925. New plant chargeable to capital account is estimated at \$147,716,000 and maintenance materials at \$98,426,000. The total of \$246,142,000, exceeds the actual amount spent by the railways in 1927 by \$20,871,000, or 8.5 per cent.

Expenditures in 1927 showed a recession from previous years; in fact, they were the lowest since the Journal has been preparing these estimates of capital expenditures, the first of which was published at the beginning of 1923. It is significant, however, that the reduction was on account of lower expenditures for maintenance materials, for the purchases chargeable to

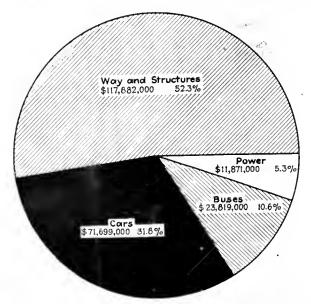


Expenditures planned for 1928 by the electric railways show a healthy increase over 1927

capital account add up to the highest total since 1924. In the preparation of these estimates the practice of

Purchases Planned by Electric Railways for 1928, Compared with Actual Estimates of Past Years Prepared by "Electric Railway Journal"

	New Plant and E	.quipment—Capital		Vanaget
1924	1925	1926	1927	Forecast 1928
Way and structures. \$56,000,000	\$52,400,000	\$51,200,000	\$77,365,000	\$89,677,000
	50,400,000	40,000,000	34,758,000	35,495,000
Cars	15,680,000	17,540,000	14,368,000	15,164,000
Power 17,000,000	5,150,000	7,640,000	3,561,000	7,380,000
Total\$133,200,000	\$123,630,000	\$116,380,000	\$130,052,000	\$147,716,000
Main	tenance Materials	and Supplies—Ope	erating	
Way and structures. \$57,500,000	\$56,900,000	\$50,000,000	\$40,517,000	\$41,697,000
	54,700,000	47,800,000	36,941,000	37,288,000
Cars	7,370,000	7,500,000	9,451,000	10,294,000
Power 18,000,000	22,650,000	11,370,000	8,310,000	9,147,000
Total\$129,500,000	\$141,620,000	\$116,670,000	\$95,219,000	\$98,426,000
Total of New P	lant and Main	tenance Mater	ials and Suppli	es
Way and structures \$113,500,000	\$109,300,000	\$101,200,000	\$117,882,000	\$131,374,000
	105,100,000	87,800,000	71,699,000	72,783,000
Cars	23,050,000	25,040,000	23,819,000	25,458,000
Power	27,800,000	19,010,000	11,871,000	16,527,000
Grand total. \$262,700,000	\$265,250,000	\$233,050,000	\$225,271,000	\$246,142,000



How the total of \$225,271,000 expended in 1927 for new plant and maintenance materials and supplies was divided

former years was followed of obtaining from a survey of the industry the actual expenditures for 1927 and the proposed expenditures for this year from budget estimates and plans furnished by operating managements. The information included in these reports was prorated to cover the industry. Not only were the number of cars and miles of track considered, but a study of the individual returns was made to eliminate the influence of unusual circumstances.

TRACK EXPENDITURES LARGE

Probably the most significant tendency shown by the figures is the large increase in expenditures for track. Actual expenditures in 1927 for track materials were 50 per cent greater than in 1926, which was but slightly below the amounts expended in the previous two years. Notwithstanding this, the expenditures for way and structures materials planned for 1928 exceed the 1927 total by another 19 per cent. With such a program for rehabilitation it is only natural that there should be some reduction in the expenditures for track maintenance. The total to be expended on way and structures for 1928 shows a large gain, both in 1927 and in the forecast for 1928. The indication is that there will be no let-down from the standard of track maintenance set in 1927, for those portions of existing lines not included in the rebuilding programs.

Not only were car purchases for 1927 considerably lower than in the previous year, but the expenditures definitely planted for 1928 show only a small increase. The total proposed is \$35,495,000, which is far below the amount spent for cars in any one of the years 1924-1926.

This may logically be considered to reflect the present unsettled car situation and the inability of managements clearly to forecast their car purchases pending the outcome of the widespread experimentation in car design. It is probable that the forecast figure for car expenditures will be considerably exceeded in 1928 by stimulated buying following successful operating experience with some of the newer types of design.

Maintenance material purchases planned for this year, while slightly larger than for last year, are still much below those for previous years. An analysis of the total

capital expenditures and a comparison with the reports of cars purchased shows that a considerable amount of rehabilitation and rebuilding work on present equipment was charged to capital account.

Bus purchases planned for 1928 are slightly greater than the record of 1927, indicating a normal growth of this branch of the industry. While the total of more than \$15,000,000 is less than the expenditures in the period of most rapid expansion in the use of buses, it indicates that this vehicle continues to be looked on as a necessary part of the railway plant. Success being achieved in the use of buses by electric railways to give preferred forms of service at a distinctly higher level of fares may result in materially increased expenditures for new buses than are indicated in the budget figures. The success achieved by single-deck buses of increased seating capacity and the alertness of bus manufacturers to the improvement of their products may likewise bring about considerably increased buying.

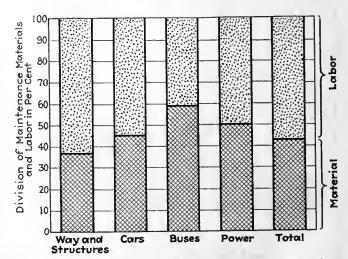
Bus maintenance materials show a considerable increase in 1927, and a still further increase is planned for 1928. The indication is that the need for heavy maintenance on buses purchased three or more years ago is becoming increasingly apparent and must be provided for.

The estimates for power expenditures on capital account were more difficult to make than for the other items, since there is some uncertainty in the replies as to the inclusion of purchased power. The returns this year enabled a better segregation to be made, so that the reduction in this item for 1927 as published does not necessarily mean a recession in the account. Since the forecast for 1928 was made on the same basis as the figure for 1927, a material increase in capital expenditures for power facilities can be expected.

MAINTENANCE MATERIALS AND LABOR SEGREGATED

In previous budget surveys it has been exceedingly difficult to make a correct segregation of labor from the expenditures planned for materials. Although only materials were asked for, there always was some doubt as to whether the replies made proper allowance for this. In the forms which were used this year separate items of maintenance materials and maintenance labor were provided. The returns which were received were remarkably complete and the segregation was made with comparatively little difficulty.

Ot the total maintenance expenditures for the year



The division of expenditures made in 1927 for maintenance into materials and labor is indicated for the elements of way and structures, cars, buses and power

Maintenance Materials and Labor

1927 Expenditures	Material. Labor. Total		Cars \$36,941,000 44,952,000 \$81,893,000	Buses \$9,451,000 6,592,000 \$16,043,000	Power \$8,310,000 8,244,000 \$16,554,000	Total \$95,219,000 126,662,000 \$221,881,000
1928 Estimated expenditures	Material	\$41,697,000 68,232,000 \$109,929,000	\$37,288,000 45,680,000 \$82,968,000	\$10,294,000 7,471,000 \$17,765,000	\$9,147,000 8,144,000 \$17,291,000	\$98,426,000 129,527,000 \$227,953,000

1927, amounting to \$221,881,000, the amount paid out for maintenance materials was \$95,219,000, or 42.9 per cent; \$126,662,000, or 57.1 per cent, was for labor. Roughly, these amounts are respectively three-sevenths and four-sevenths of the total.

In the way and structures accounts, the proportion spent for materials is the lowest, being only 37.7 per cent. This was to be expected, on account of the low relative cost of track materials and the great amount of hand labor involved.

Car maintenance costs show that 45.1 per cent is spent for materials and 54.9 per cent for labor. Contrasted with this, bus maintenance requires an expenditure of 58.8 per cent of the total for materials and only 41.2 for labor. This difference is quite marked, varying but little throughout the individual returns.

Power maintenance requires an almost equal division of the items, 50.2 per cent going for materials.

Estimated labor and material figures for 1928 give practically the same relations between materials and labor as the figures for 1927, checking the proportions. Of the total of \$227,953,000 to be spent, \$98,426,000, or 43.2 per cent, will be for materials. The figures for way and structures maintenance show an increase of 3.6 per cent for materials.

The complete tables for the two years are included, and the proportions of labor and materials for the several items are given in the accompanying chart.

Statements from Leading Executives Give

High Spots of the Year's Operation

While traffic was somewhat less in 1927, better business is anticipated by many leading operators. Comments indicate that progressive measures have resulted advantageously to the companies adopting them

NECUTIVES of electric railway companies all over the United States and Canada indicate that the present year bids fair to show revenues higher than those of 1927. While final figures for the entire country are not available, indications are that last year's traffic will be about 1 per cent under the 1926 record of sixteen billion passengers. Progress has been made, however. The reduction in general business has had only a minor effect on the transportation companies.

As Managing Director Storrs sees it, the industry enters upon 1928 with promise of a continued upward swing in its affairs. He considers the outstanding accomplishments of 1927 to be the service improvements that have been made, and the work that has been started in the development of modernized cars that are attractive, light-running and less noisy. He regards as very important the co-ordination under electric railway managements of all major local transportation facilities, including rail

cars and buses and in some instances taxicabs. He also regards it as significant that many communities have, with public approval, adjusted fares to a point approximating compensation for good service rendered.

President Stevens anticipates a continuation of the substantial progress made by the electric railways during the year. In his opinion even more progress can be anticipated than in any other year for a long time, first, because of the general awakening of the public to the fact that electric railway transportation cannot be dispensed with; second, because experience in operating buses has determined their limitations as well as their advantages and, third, because the opportunity exists to take advantage of the great progress that has been made in car design and construction.

The opinion of these and other prominent executives on the results of last year's business and the prospects for the coming year are given on the following pages.

American Electric Railway Association

CONDITIONS in the local transportation field throughout the United States and Canada improved during the last year. The industry enters upon the year 1928 with promise of a continued upward swing in its affairs.

Outstanding accomplishments during 1927 are service improvements, particularly in the installation of modernized cars that are comfortable, light-running and less noisy. Co-ordination of major transit facilities, including rail cars and buses and in some cases taxicabs under electric railway managements, has been

Rates of fare in many communities have been adjusted, with public approval, to a point approximating adequate compensation for good service

The industry is no longer merely waiting for "necessity riding." The managements realize that if the electric railways companies are going to compete successfully with their keenest competitor, the private automobile, they must render service that will attract those who have been using this personal means of conveyance. While the rail car is the most economical vehicle for mass transportation the bus also has shown that it is a great supplemental aid in a general transportation service. Co-ordinated under single managements these two vehicles give the best possible local transportation.

Because the industry is viewing its future usefulness with recognition of the changed conditions and requirements for its service, and is no longer allowing its expansion to be circumscribed by a mere statistical vision of its past history, the indications for 1928 are better than in any other recent year.

L. S. STORRS. Managing Director.

American Electric Railway Association

FOR the year 1928, I can anticipate continuation of the substantial progress made by the electric railways in the past year. In my opinion, even more progress can be anticipated than in any other year for a long time; first, because of the general awakening of the public to the fact that electric railway transportation cannot and is not going to be dispensed with; second, because experience in operating buses has determined their limitations as well as their advantages; and third, because of the opportunity which exists to take advantage of the great progress that has been made in street car design and construction.

The purpose of every electric railway system is to supply its communities with a service that will meet the public needs; be so acceptable that the revenues will pay for that service and yield a proper return to those whose investments have made the service possible,

thus inviting new capital at reasonable cost to meet ever-expanding requirements. With public consciousness awakened to the realization that electric railway transportation is essential to community progress, the electric railway situation has made rapid strides during the past year. It is true that during the last few years traffic has grown very little, and that even in some places the number of revenue passengers has decreased, but this is due no doubt to the intense competition of private and public automobiles, especially the former.

Notwithstanding this experience in the past, history furnishes no ground for the opinion that the street car is becoming obsolete. The bus lines are handling only a very small proportion of the total number of passengers carried and, as a general rule, are not giving indications that they may be expected to handle any material increase in the percentage of the total local transportation.

To me, the greatest progress in electric railway transportation the past year was the long stride taken in the development of the new types of cars and equipment which, although they are not fully developed and therefore do not yet accomplish the desired results, indicate a great awakening as to the necessity of

effort and attractions the increase of railwa R. P. Stevens, President. real sales effort and attractive possibilrailway ities for revenues.

We believe the prospects for this year are good through better public understanding, through the ride sales campaign participated in by every employee and through the development of public opinion. Traffic congestion is still a problem, but with growing recognition of the efficiency of the street car it is becoming less acute. [B. J. YUNGBLUTH]

Houston Electric Company

Houston, Texas

WITH the fare increase which has been effective for the past six months, we will show a 10 per cent increase in our gross earnings for 1927. Our estimates will call for a further increase in gross revenue of 10 per cent for the coming twelve months. Seventy per cent of this should find its way to the net. The public is showing great interest and appreciation in the new equipment which was furnished during the past year, indicating that service to the patrons is more important than the cost. All signs point to an improved showing for 1928.

JEFF L. ALEXANDER, Manager.

Southern Pacific Company and Pacific Electric Railway

Los Angeles, Cal

EARNINGS of the electric railways continue to be unsatisfactory although our principal interurban system, the Pacific Electric Railway, has made in 1927 a materially improved showing over 1926, largely due to freight traffic. The electric railways and street car systems in the smaller towns just about held their own where there were no unusual circumstances affecting results. So far as 1928 is concerned, it does not seem probable there will be any material change from 1927. There has been no increase in expenses except where extraordinary maintenance has been a factor.

PAUL SHOUP,

President Pacific Electric Railway;
Vice-President Southern Pacific Company.

Cleveland Railway

Cleveland, Ohio

VOLUME of traffic of the Cleveland Railway was less in 1927 than in 1926, which had been slightly greater than the preceding year. In my opinion this reflected lessened industrial and trade conditions rather than competition from privately owned motor cars.

With declining traffic late in 1925 our rate of fare was advanced under our service-at-cost plan so that our passenger receipts last year were the largest in our history. This combination made possible improved service with lessened expense. Material reductions in maintenance, in power and in the cost of injuries and damages were effected. I believe we have touched the low of traffic recession and with service on a higher plane the coming year will bring us better results than the past year.

JOSEPH H. ALEXANDER,

Chicago Rapid Transit Company

Chicago, Ill.

TRAFFIC on the Chicago Rapid Transit Company lines decreased about 1 per cent in 1927. Passenger and freight traffic on the interurban lines Wages and increased satisfactorily. other charges were somewhat higher on all properties. We look for normal improvement in both passenger and freight traffic for 1928. BRITTON I. BUDD,

International Railway

Buffalo, N. Y.

MPROVED public relations resulting I from a better understanding of the transit problem on the frontier is the outstanding achievement of last year in Buffalo. The need for a financially sound transit system providing efficient, courteous service is generally recognized and is resulting in a more sympathetic public attitude. Considerable track and paving reconstruction was done in 1927, equipment maintenance standards were raised and employee morale was greatly strengthened. The motorbus lines recently installed are well patronized, resulting in extensive improvements in this service. We believe the prospects for next year are good through better public understanding, through the ride sales campaign participated in by every employee and through the development of public opinion. Traffic congestion is still a problem, but with growing recognition of street car efficiency it is becom-B. J. YUNGBLUTH, ing less acute.

We are optimistic on next year's business. Atlanta's building program, with the city's natural growth, taken in connection with our recent fare increase, should give the Georgia Power Company the most prosperous year since 1920. [F. L. BUTLER]

Denver Tramway Corporation

Denver, Col.

PERATING revenue of the Denver Tramway Corporation for 1927 continued to decline. It was necessary to pass most of the decrease down to the net, as the operating economies effected during the year were more than offset by the higher prices which had to be paid for fuel requirements on account of a strike in the Colorado coal fields. Expenses for 1928 will show no decreases unless one-man operation is further extended, while the trend of travel still seems to be downward. We trust that this year, however, will witness the satisfactory culmination of many years of litigation over franchises and rates, which may be the long-lookedfor turning point for the better.

H. S. ROBERTSON, President.

Birmingham Electric Company

Birmingham, Ala.

ROSS earnings of the Birmingham GROSS carmings of the past year decreased 3 per cent, due chiefly to part-time operations in local industrial plants. Operating expenses showed a small increase over 1926, due chiefly to the increased wage scale for platform men. The comprehensive rerouting plan effected in June, 1927, as a result of a traffic survey, has resulted in a substantial saving in car-hours, which will reduce the operating ratio in 1928.

J. S. Pevear.

Vice-President in Charge of Operation.

New Orleans Public Service, Inc.

New Orleans, La.

REVENUE for 1927 shows a decided decrease over last year. We are not able to predict for next year, owing to the uncertainty of the national program in connection with the Mississippi Valley.

H. B. FLOWERS,

Indianapolis Street Railway

Indianapolis, Ind.

OTAL gross earnings of the Indianapolis Street Railway for 1927 were \$5,410,000 as compared with \$5,518,000 for 1926. Total operating expenses in 1927 were \$4,089,000, as compared with \$4,269,000 for 1926. Net earnings less taxes for 1927 were \$1,013,000, as compared with \$594,700 for 1926. During 1927 five substations were built in Indianapolis, resulting in a substantial reduction in the cost of power. The entire stock of competitive bus lines was acquired at the close of 1927 and all buses will be jointly operated in 1928. The adoption of tokens has resulted in a more systematic method of collecting and accounting for fares. We are operating 100 one-man cars out of a total of 300. It is anticipated that these economies in operation will result in material saving for 1928.

ROBERT I. TODD, President.

Boston Elevated Railway

Boston, Mass.

BOSTON Elevated Railway traffic slightly decreased during 1927 but the net revenue will be greater than a year ago. We look forward to a substantial year in 1928, both in traffic and operating efficiency.

EDWARD DANA, General Manager.

I believe we have touched the low of traffic recession and with service on a higher plane the coming year will bring us better results than the past year, especially the latter part. [Joseph H. ALEXANDER, Cieveland]

Portland Electric Power

Company Portland, Ore.

REVENUE on the Portland Electric Power Company city lines has shown a steady decrease since 1921, due to increasing inroads by automobiles.

The year 1927 was no exception. Gross revenues on the city lines, including buses, decreased 2.62 per cent in spite of an increase of 2 per cent in car and bus-miles operated, largely occasioned by an increase in bus service. Operating expenses of cars and buses decreased 0.65 per cent, due to extension of oneman operation which more than offset increased cost of operating additional buses. Substantial sums spent in modernizing equipment and in extensive advertising campaigns apparently had no influence in retarding the steady drop in revenues. During 1928 we will attempt to provide necessary extensions of service, but we must make every effort to conserve expense and the general policy will be one of retrenchment. W. H. LINES,

Vice-President in Charge of Railways.

The public is showing great interest and appreciation in the new equipment, indicating that service to the patrons is more important than the cost. All signs point to an improved showing for JEFF L. ALEXANDER Houston

Capital Traction Company

Washington, D. C.

TRAFFIC on the Capital Traction Company in 1927 was a great disappointment. Automobile competition was felt more severely than in any previous year and caused a falling off in revenue passengers of 4.25 per cent. As expenses and fixed charges were practically the same as in 1926, the net income was materially decreased. The determined drive for selling low-priced automobiles now apparent give little room for optimism in the future and increased rates of fare seem inevitable.

J. H. Hanna, President.

Dallas Railway & Terminal Company

Dallas, Texas

THE business of the Dallas Rail-The business of the Samuel Tway & Terminal Company showed a falling off in 1927 compared with 1926 of approximately 7 per cent in the number of passengers carried. Due to operating economies, principally the employment of more one-man cars in service, we were able, however, to earn and pay our permitted return of 7 per cent on the property value. A great deal of replacement work has been done during 1927 on the property, but our reserves are in such a depleted condition we have found it necessary to apply to the City Commission for an increased fare. This application was presented on Jan. 9, asking for a 10-cent cash fare with five tickets for 35 cents. Should this request be granted we feel that we will be able greatly to improve the condition. of our property and our service to the public during 1928.

RICHARD MERIWETHER. Vice-President and General Manager.

The outlook for 1928 is more encouraging as to gross business, with no apparent extraordinary burdens in opera-J. P. BARNES Louisville tion.

Washington Railway & Electric Company

Washington, D. C.

WASHINGTON Railway & Electric Company shows 1.36 per cent decrease in revenue passengers carried in 1927 compared with 1926. Operating revenues show a slight increase and operating expenses a slight decrease, leaving approximately 5 per cent increase in operating income. We look for further improvement in 1928.

WILLIAM F. HAM, President.

Brooklyn City Railroad

Brooklyn, N. Y.

BEGINNING the year 1928, the electric railway industry in spite of the present turmoil over transportation matters in New York, never faced a brighter outlook. There will doubtless always be a golden calf that will receive a certain amount of worship, but the electric railway is and will continue to be the backbone of urban mass transportation, and this fact is being recognized to a greater degree each day.

The industry has passed through its

most trying period.

C. E. MORGAN, Vice-President and General Manager.

Toronto Transportation Commission

Toronto, Ont., Canada

RAFFIC in 1927 on the Toronto TRAFFIC in 1927 on the Transportation Commission's system has been quite satisfactory and approximately 4,260,000 more passengers were carried on the street railway and motor bus lines than in 1926. At our average fare of 6.17 cents this results in about \$260,000 improvement in gross revenue. In addition, our motor coach operations at separate fares and not in competition with the railway have shown remarkable growth and total \$580,000, or 90 per cent more than last year. The total of operating expenses slightly increased in 1927 because of more business, but the unit per car-mile is reduced and is now 28 cents exclusive of depreciation. Our operating ratio is also reduced to 61.5. About 16 per cent of our car mileage is one-man operation. Business conditions appear favorable for 1928 and we hope for continued improvement in traffic in spite of the very serious competition from private auto-D. W. HARVEY. General Manager.

Philadelphia Rapid Transit Company

Philadelphia, Pa.

ALTHOUGH the latter portion of 1927 witnessed a definite falling off in street car riding in Philadelphia, there seems to be no occasion for grave alarm concerning prospects for the current year. It is probable that the decrease in riding was occasioned by a temporary slowing up of industry in this section. Excellent records have been established by the Philadelphia Rapid Transit Company during 1927 for accident reduction and for operating economies. In the current year we shall aim toward a further co-ordination of public transportation media in

this city. It is not expected that traffic and operating expenses will fluctuate materially during 1928.

R. T. SENTER, President.

We look forward to a substantial year in 1928, both in traffic and operating effi-[EDWARD DANA] ciency.

Georgia Power Company

Atlanta, Ga.

STATISTICS for 1927 are not available until next week, but the Georgia Power Company expects a decrease of 2½ per cent in operating revenue and 2 per cent in expenses. We are optimistic on next year's business. Atlanta is building two viaducts at a cost of \$2,000,000, a new \$1,000,000 city hall, and its school-building program calls for between three and four million. This program, with the city's natural growth, taken in connection with our recent fare increase, should give the Georgia Power Company the most prosperous year since 1920.

F. L. BUTLER, Vice-President in Charge of Operation.

Louisville Railway

Louisville, Ky.

EARNINGS of the Louisville Rail-due to reduced riding. This is probably a reflection of rather quiet business conditions, especially during the summer. The net result of the year's operation is approximately one quarter million dollars applicable to common stock. A 3 per cent dividend was paid. The outlook for 1928 is more encouraging as to gross business, with no apparent extraordinary burdens in oper-J. P. BARNES, President.

TO ME, the greatest progress in electric railway transportation the past year was the long stride taken in the development of the new types of cars and equipment which, although they are not fully developed and therefore do not vet accomplish the desired results, indicate a great awakening as to the necessity of real sales effort and attractive possibilities for the increase of railway revenues.

—R. P. STEVENS.

Marked Increase in Track Construction in 1927

Mileage of electric railway track rebuilt exceeded that of any other recent year. Extensions were slightly less than in 1926.

Amount of track abandoned was small compared with amount of new bus routes added

REATER activity in track reconstruction was shown by the electric railways in the year just ended than in any other year since 1917. Reports received by this paper from more than 650 companies indicate that approximately 900 miles of track was rebuilt in 1927. This is the largest figure of any year for which records are available. At the same time, extensions to city and interurban trackage and electrified steam lines totaled more than 300 miles, making the sum total of all trackwork done by the electric railway industry last year about 1,220 miles.

Altogether 217 electric railways reported track rebuilt during the past year. This was an increase over 1926, when 181 companies made such reports, and 1925, when

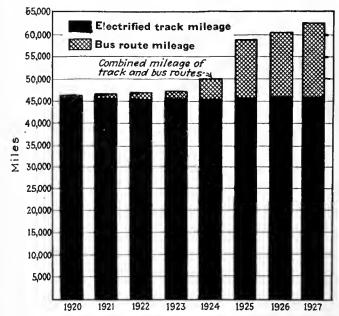
Comparison of Track Construction by Years

		-Trac	k Exter	-Tra	fied			
	No. of		-Miles-			-Miles $-$		Steam
	Com-		Inter-			Inter-		Lines,
Year	panies	City	urban	Total	City	urban	Total	Miles
1908	157	(a)	(a)	1174.5	(a)	(a)	(a)	84.00
1909	160	(a)	(a)	774.7	(a)	(a)	(a)	112.40
1910	217	(a)	(a)	1204.8	(a)	(a)	(a)	192,40
1911	223	(a)	(a)	1105.0	(a)	(a)	(a)	86.50
1912	171	(a)	(a)	869.4	(a)	(a)	(a)	80.80
1913	181	(a)	(a)	974.9	(a)	(a)	(a)	119,00
1914	163	(a)	(a)	716.5	(a)	(a)	(a)	229.00
1915	136	(a)	(a)	596.0	(a)	(a)	(a)	448.20
1916	104	115,40	240.90	356.30	(a)	(a)	(a)	388.00
1917	121	251.10	125,60	376,70	(a)	(a)	375.40	66.00
1918	80	216.41	97.41	313.82	(a)	(a)	155.43	275.70
1919	73	110,90	29,67	140,57	307,06	82.82	389.89	287,60
1920	87	145,69	30,87	176,56	246,21	115.56	361,77	8,92
1921	78	108.15	38.95	147.10	488,96	126,25	615.21	8.08
1922	104	126.27	85, 11	211.38	584.75	154.95	739.70	12.35
1923	272	169.61	63.54	233.15	559.77	294.86	854.63	26.12
1924	243	218.09	93.99	312.08	585.51	178.82	764.33	83.39
1925	207	227.31	112.48	339.79	485.75	93.15	578.90	236.36
1926	236	193.20	124.76	317.96	594.35	208, 17	802.52	169.52
1927	235	152.99	39,42		691.34	196.60	887.94	140.70

(a) Information not available.

the number was only 160. Approximately 700 miles of city track was rebuilt, as compared with 600 miles the preceding year. Reconstruction of interurban track totaled approximately 200 miles, or very nearly the same amount as was reported for the preceding year. Companies which rebuilt interurban track last year numbered 67, as compared with 63 in 1926 and 46 in 1925.

Extensions to city track last year totaled about 150 miles, or somewhat less than the total for the year before, which was about 200 miles. The number of companies making extensions to city track, however, was slightly larger than the year before, although it was less than two years ago, the figures being 80 in 1927, 75 in 1926 and 80 in 1925. Extensions to interurban track in 1927 were substantially less than the preceding year, due to the absence of any large extension programs. Nevertheless, 34 electric railways reported a total of approximately 40 miles of interurban trackage added during the year.



Combined track and bus mileage of the electric railways has increased more than one-third since 1920

In 1926 companies which built new interurban track numbered 38 and in 1925 the number was 35. An accompanying chart shows graphically the comparative amount of reconstruction by years since 1919, as well as the annual additions to electric railway trackage.

First place among the city companies which rebuilt track last year is held by the Chicago Surface Lines with some 45 miles of reconstruction. The Pittsburgh Railways and the Philadelphia Rapid Transit Company come next in order, with about 30 miles of reconstruction apiece. Other electric railways which executed large programs of this kind during the past year include the Kansas City Public Service Company, Cincinnati Street Railway, Public Service Railway of New Jersey, St. Louis Public Service Company, Key System Transit Company, Los Angeles Railway and the Cleveland Railway. The Illinois Traction System holds first place in reconstruction of interurban track during the past year. Extensive work of a similar nature was done by the Texas Electric Railway and the Pacific Electric Railway.

Outstanding among the extensions to city trackage which occurred during the past year was the addition of more than 29 miles to the New York State Railways at Rochester. This came about through the conversion of a portion of the old Erie Canal into a rapid transit subway through the city. An extension of about 8 miles was made by the Twin City Rapid Transit Company and one

Table I—Track Extensions and Reconstruction in 1927

	Extensio	Inter-		lt, Miles Inter-		Extension,	Inter-		t, Miles Inter-
Name of Company Alabama	City	urban	City	urban	Name of Company Michigan Department of Street Rys., Detroit	City	urban	City	urban
Alabama Power Co	2.37	0.38	2.50 10.31 0.79	0.22 3.40	Detroit United Ry Duluth Street Ry	. 3.66 . 0.54	0.13	9.33 4.22 3.13	• • • • •
Arkansas		****			Graud Rapids R.R			0.52	0.57
Arkansas Power & Light Co		• • • •	6.31 0.38 1.00		Minnesota Twin City Rapid Transit Co		0.10	1.87	
California Los Angeles Ry	3.06		14.05		Mississippi Mississippi Power & Light Co			1.50	
Key System Transit Co	0.37		14.89 3.11 1.10	2.82	Missouri				
Pacific Electric Ry Sacramento Northern Ry	3.20	6.30	5.50	17.80 0.67	Kansas City Public Service Co. Missouri and Kansas Ry.	0.15		21.18	
San Diego Electric Ry			2.61	1.97	Springfield Traction Co St. François County R.R			1.03 1.00	
Southern Pacific Co		• • • •		1.97	St. Joseph Railway, Light, Heat & Power Co St. Louis Electric Terminal Ity		0.04	2.00	0.16
Denver Tramway Denver & Intermountain R.R		0.92	1.27 0.67	0.02 0.05	St. Louis Public Service Co	0.32	0.03	15.61	2.00
Ft. Collins Municipal Ry So, Colorado Power Co			0.97		Montana Montana Power Co	0.15		2.35	
Connecticut					Nebraska				
Connecticut Co	0.25	1.31	10.02	6.65 0.50	Liocoln Traction Co		• • • •	0.37 1.50	
Delaware			1.93		New Hampshire	****	••••	1.50	
Delaware Electric Power Co District of Columbia		• • • •			Manchester Traction, Light & Power Co			1.80	• • • •
Capital Traction Co			1.50 5.19		New Jersey Atlantic City and Shore R.R	4.75		1.21	1*11
Florida			2 12		Public Service Ry. Trenton & Mercer County Traction Corp	0.35 0.51	0.03	17.53	0.35
Jacksonville Traction Co		0.85	2.13	0.85	New York Binghamton Ry.			0.92	
Municipal Railways, St. Petersburg Tampa Electric Co	2.20		0.33 7.00		Brooklyn City R.R. Brooklyn-Manhattan Transit Corp.	0.34		4.84	
Georgia Georgia Power Co	3 31		7.34		Fooda, Johnstown & Gloversville R.R			12.30	
Macon Railway & Light Co	1.17		1.64		Hudson Valley Ry Interborough Rapid Transit Co	4.22	1111	2.23	2111
Savannah Electric & Power Co		• • • •	0.48	0.33	International Ry		0.12	4.45	0.42.
Aurora Elgin & Fox River Electric Co		• • • •	2.77	0.68	Jamestown Street Ry. Manhattan & Queens Traction Corp			0.72 4.73	
Chicago & Joliet Electric Ry			0.50	3.00	New York & Queens County Ry New York Rys			3.24 3.91	
Chicago, North Shore & Milwaukee R.R		2.61	2224		New York, Westchester & Boston Ry New York State Rys		3.52	10.16	
Chicago Rapid Transit Co	2.46		8.90 44.76		Richmond Ry			0.32	0.27
Chicago & West Towns Ry East St. Louis & Suburban Ry		• • • •	5.00	1.52	Schenectady Ry			2.98	1.00
Fox & Illinois Union Ry. Co			0.50 2.27		Syracuse and Eastern R.R			8.31	0.50
Illinois Power & Light Corp		4.66	3.56	22.67	Third Ave. Ry. United Traction Co., Albany			2.91	
Indiana	• • • •		••••	22.07	North Carolina Carolina Power & Light Co	0.41			
Chicago, South Bend & Northern Indiana Ry	0.44	0.02	3.34 0.28		Durbam Public Service Co			0.45	3,00
Gary Rys	0. 27		2.50 5.14		North Dakota			• • • •	5.00
Indiana Service Corp Interstate Public Service Co	0.73 0.62		1.26	0.37	Northern States Power Co			0.27	0.57
Northern Indiana Power Co	0.50		0.30 2.56		Ohlo Cincinnati, Hamilton & Dayton Ry		1.72		0.70
Terre Haute Traction & Light Co		0.15	1.70 0.18	0.95	Cincinnati Street Ry City of Asbiabula, Division of Street Rye			21.12 0.54	
Iowa	0.07	0.15	0.10	0.55	Columbus, Delaware & Marion Electric Co	6.08		12.04	
Cedar Rapids & Marion City Ity Des Moines City Ry	0.06		1.00		Community Traction Co., Dayton Indiana, Columbus and Eastero Traction Co.	0.89		5.16	0.90
Sioux City Service Co			2.46 0.90		Lima-Toledo R.R Nelsonville Athena Elec. Ry		0.11	0.25	• • • •
Kansas		• • • •	V. 70	• • • •	Northern Ohio Pwr. & Light Co Ohio Public Service Co			3.71 0.80	1.80
Arkansas Valley Interurban Ry			2.00	0.05	Pennsylvania-Ohio Electric Co	1114		0.92 5.00	5.00-
Kansas City, Leavenworth & Western Ry Union Traction Co		0.10	1.50 1.25		Springfield Ry. Co Stark Electric R.R.	0.14		1.70	3.00
Kenjueky					Steubenville, East Liverpool & Beaver Valley Traction Co.			0.75	3.00
Cincinnati, Newport & Covington Ry Kentucky Traction & Terminal Co			2.27 0.63		Toledo, Bowling Green & Southern Tract. Co			1.52	
Kentucky Utilities Co			0.68 2.29	i.53	Toledo & Western Ry			6.54	0.51 2.30
Louislana					Youngstown Municipal Ry Oklahoma			0.57	• • • •
New Orleans Public Service, Inc			4.93 1.29		Oklahoma Ry Окlahoma Union Ry	1 25	0.57		
Maine			0.25		Tulsa Street Ry.			0.42	
Biddeford & Saco. R.R			0.25 1.42	::::	Oregon Portland Electric Power Co		0.68	3,00	0.50
Maryland Potomac Edison Co			0.50		Penusylvania				
United Rya. & Electric Co	2.07	• • • •	14.00		Altoona & Logan Valley Electric Ry Beaver Valley Traction Co			2.27	4.00 2.65
Massachusetts Berkshire Street Ry	0.04		0.76	1.14	Conestoga Traction Co			1.00 0.56	0.68
Boston Elevated Ry Eastern Massachusetts Street Ry	0.09		10.56 9.73	4.84	Erie Rv			0.88 2.50	
Holyoke Street Ry			2.42		Harrisburg Ry Irwin, Herminie Traction Co. Johnston Traction Co.			1,50	2.00
			0.50	3.00 4.00	Lehigh Valley Transit Co	0.00	1.06	2.45	0.44
Springfield Street Ry	1.62	• • • •	6. 29 4. 89	1.00	Philadelphia & West Chester Traction Co Philadelphia Rapid Transit Co	(0.39	29.82	4.65
Communication better lig		••••			A TEMPO A LEMENT CO.,				

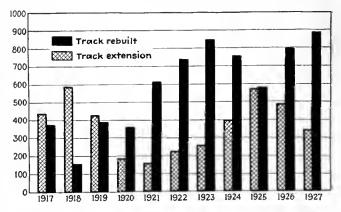
Table I—Track Extensions and Reconstruction in 1927—(Concluded)

	Extension,	Miles Inter-	Rebuilt	, Miles Inter-		Extension,		Rebuilt,	
Name of Company	City	urban	City	urban	Name of Company	City	Inter- urban	City	Inter- urban
Pennsylvania (Continued) Phillipsburg Trausit Co. Pittsburgh Ry. Reading Trausit Co.	2.30	0.38	0.57 30.56 2.97	0.54 2.50	Virginia Public Service Co Sandston Ry			0.85 0.50	0.50
Scranton Ry Shomokio & Mt. Carmel Trausit Co Subbury & Selinsgrove Ry Tarentum, Brackenbridge & Butler St. Ry.			4.88 0.36 1.10 0.37	9.90 6.00	Washington Puget Sound Power & Light Co. Seattle Municipal Street Ry. Tacoma Municipal Belt Line. Willapa Electric Co.	. 1.67	0.11	4.39 4.00 0.19	
Warren St. Ry. West Penn Ry. West Chester St. Ry. Williamsport Ry. York Rys.	0.25	0.04	0.57 0.59 0.50 0.74 1.25	1.62	Most Virginia Monongahela West Penn Public Service Co Wheeling Public Service Co Wheeling Traction Co.			1.00	0.30 6.72
Rhode Island United Electric Rys	2.37		3.41		Wisconsin Madison Rys.			0.33	
South Carolina Power Co			2.27		Milwaukee Elec. Ry. & Light Co. Milwaukee Northern Ry. Wisconsin Gas & Electric Co.	. 2.60	2.18	9.03 0.21	6. 16 1. 00
Tennessee Jackson Ry. & Light Co Knoxville Power & Light Co Memphis Street Ry Nashville Ry. & Lt. Co	3.02	0. i ż	0.50 3.71 0.54 9.19	3.49	Wisconsin Power & Light Co. Wisconsin Valley Electric Co. Northern States Power Co. Wisconsin-Michigan Power Co.			0.72 1.20 0.34 0.70 0.58	1.00
Texas					Porto Rico Porto Rico Railway, Light & Power Co			7.00	
Dallaa Ry. & Terminal Co. Eastern Texas Electric Co. El Paso Electric Co. Galveston Electric Co. Houston Electric Co. Nortbern Texas Tract, Co. San Autonio Public Service Co. Texas Electric Ry. Wichita Falls Traction Co.	3.78 0.34 0.46		7.55 0.50 2.32 2.18 2.71 7.48 2.26 	21.00	Canada British Columbia Electric Ry. Calgary Municipal Ry. Dominson Power Transmission Co. Hull Electric Co. Hydro-Electric Rys. Levis Tramways Co. London Street Ry.	0.63		4. 14 1.50 4.00 1.30 0.70 0.19 1.50	
Utah Bamberger Electric R.R. Utah-Idaho Central R.R. Utah Light & Traction Co.		0.50	1.00 5.12		Moose Jaw Electric Ry Montreal & Southern Counties Ry. Montreal Tramways Co. New Brunswick Power Co. Niagara, St. Catharines & Toronto Ry.	4.38	2.27	0.74 0.23 10.73 2.00 0.63	4.03
Vermonf Burlingtou Traction Co Vergennes Power Co Virginia			0.75 0.50	1. 20	Nova Scotia Tramways & Pwr. Co. Ottawa Electric Ry. Quebec Raifway, Light, Heat & Power Co Regina Municipal Ry. Sherbrooke Ry. & Power Co	0.35		0.64 2.00 0.78	
Arlington & Fairfax Ry Mt. Vernon Alexaodria & Washington Ry Virginia Electric & Power Co Roanoke Railway & Electric Co Petersburg-Hopewell & City Point Ry	5.76		2.00 6.12 0.27	2. 24 3. 00 	Saskatoon Municipal Ry. Toronto Transportation Commission. Winuipeg Electric Co.	0.45	0.33	3.38 4.10 691.34	196.60

of 9½ miles by the Municipal Railway of San Francisco. Substantial extensions of city trackage were reported also by the Pacific Electric Railway, Los Angeles Railway, Detroit Department of Street Railways, Detroit United Railway, Interborough Rapid Transit Company, Cleveland Railway, Georgia Power Company, Houston Electric Company, Virginia Electric & Power Company, and the Montreal Tramways. The most notable extensions to interurban trackage were made by the Pacific Electric Railway, Illinois Traction System and the New York, Westchester & Boston Railway.

Another important branch was added to the rapid transit system of the Boston Elevated Railway, Boston, Mass., by the opening, on Nov. 5, of the first section of the Dorchester tunnel extension. This extension runs from Andrew Square, which has been the terminal for some years, to Fields Corner in Dorchester and cost \$5,000,000. It is being carried to Mattapan as fast as the work can be done, at an expense of another \$5,000,000. The new line is a heavy, rock-ballasted, third-rail road, smooth riding and quiet. The roadbed occupied is

the former roadbed of the New Haven Railroad, purchased by the Boston Elevated. This development may lead to the abandonment of more short-haul business by the steam railroads entering Boston, in order that it



Track reconstruction in 1927 was greater than in any other year of the past decade

Electrified Steam Railroad Extensions

	Single Track Miles
N. Y. Connecting R.R	. 14.86
New York, New Haven & Hartford A.R	. 8.55
Boston Elevated Ry	. 5.24
Northeast Oklahoma R.R	
Canadian Nat'l. Railways (St. Clair Tunnel)	. 3.50
Pacific Electric Ry	
Long Island R.R	. 93.70
New York & Harlem R.R	4.86
New York Central R.R.	. 6.78
	140.70

may be more advantageously handled by the local railways, mainly the Boston Elevated.

The New York, Westchester & Boston Railway's extension of its eastern division to a new terminal at Harrison, N. Y., was completed on July 2 and opened for regular service on July 3. With the opening, Harrison became the eastern division terminal, which since March, 1926, had been at Mamaroneck. For fourteen years prior to that time the terminal was at Larchmont. A further extension to Rye is already under way. This makes another step toward the projected establishment of

Table II—Partial Track Abandonments in 1927

		les of Trac	k		1	Mil	es of Trac	ck	
	Service Sus-	Aban-	Re-	Type of		Service Sus-	Aban-	Re-	Type of
Alabama Birmingham Elec. Co	pended 1.07	doned	nioved	Servica City	Nebraska Lincoln Traction Co	pended	doned	moved	Service City
Arizona Street Railway Dept.—City of Phoenix.	6.00			Interurban	New Jersey	. 40			•
Arkansas Fort Smith Light & Traction Co				City	Coast Cities Ry				
California Key System Transit Co		4.23		City	Auburn & Syracuse Elec. R.R Brooklyn City R.R.				City
Market Street Ry	3.68				Brooklyn-Man, Transit Corp. Eastern N. Y. Utilities Corp. Empire State R.R.	2.00	10.82		
Sacramento Northern Railway		54	8.40	Interurban Interurban	Hudson Valley Ry	12.92	19.92		Interurban City
Southern Pacific Co			. 68 18. 77	City City	Jamestown Street Ry			1.46 2.30	Interurban City
Colorado Denver and Intermountain R.R				Interurban	N. Y. & Stamford Ry. Co	35.96			Interurban Interurban
Denver & Interurban R.R. Denver Traniway			45.63	Interurban City	Olean, Bradford & Salamanca Ry	15.00 70.00	70.00		Interurban
Fort Collins Municipal Ry			. 19	Interurban City	Staten Island Midland Ry Third Ave. Ry	18.79		. 22	City
Southern Colorado Ry Connecticut				City	United Traction Co		3.64	2.47	City
Connecticut Co		4.15 16.23	23.72	City Interurban	Durham Pub. Serv. Co		50		City City
New Haven & Shore Line Ry	9, 25 3, 00	3.00		Interurban Interurban	North Dakota				O.
Delaware Delawara Elec. Pwr. Co			. 97	City	Northern States Pwr. Co		• • • • • •	1.33	City
Dist. of Columbia			2.18	Interurban	Ohio Cleveland Ry Community Traction Co			.32	City
Capital Traction Co	2.60			City	Northern Ohio Pwr. & Light Co	3.41	3.56	3.23 3.56	City
Flurida				Interurban	Ohio Public Service Co	2.40	. 29		Interurban City
Jacksonville Traction Co	6.10		. 17	City	Pennsylvania-Ohio Elec, Co		. 25		Interurban City
Georgia	. 39			City	Oklahoma Nortbeast Oklahoma R.R			47	Interurban
Georgia Pwr. Co	. 88	88	.88	City City	Oregon			. 77	Interarban
Idaho				City	Portland Electric Pwr. Co	12.90		1.50	Interurban Interurban
Boise Valley Traction Co		• • • • • •	• • • • •		Pennsylvania				
Central Illinois Public Service Co Illinois Power & Lt. Corp	1.19 28.42				Erie Ry Harrisburg Ry	. 78 1.00	9.00		City City
Indiana Indiana Service Corp	18.97	18.97		Interurban	Indiana County Street Rys Lebigh Valley Transit Co Philadelphia Rapid Transit Co	4. 21		4,90	Interurban City
Indianapolis Street Ry Iowa		. 39	. 11	_	Pittsburgh Rys Reading Transit Co		133	4.59	City City
Clinton Street Ry	3.75			City	Shamokin & Edgewood Elec. Ry		9.42		Interruban Interurban
Tri City Ry. of Iowa	1.10	• • • • • •		City	Shamokin & Mt. Carmel Transit Co Westchester Street Ry	2.30	75		Interurban City
Kansas City, Lawrence & Topeka Elec.	12.00			Interurban	West Peun Rys	3.00 3.92			Interurban Interurban
Kansas City, Leavenworth & Western Ry.	2.76			Interurban	Rhode Island				-
Kansas City Pub. Service Co Kansas Elec. Pwr. Co	1.50		. 40		Newport Elec, Corp		22.00		Interurban
Joplin & Pittsburg Ry	9.30				Tennessee		1.84 23.57	77	City Interurban
Kentucky Utilities Co Louisville Ry	2.45	1.65	2.45	City City	Memphis Street Ry	• • • • • •	1.17	. 16	City
Louisiana Louisiana Elec. Co New Orleans Pub. Service, Iuc	7.55			City	Texas Dallas Ry, & Terminal Co	.81			City
Maine	4.12			City	El Paso Elec. Co	.50	1.80		City
Yerk Utilities Co	31.50	• • • • • •		Interurban	Texas Elec. Ry	3.00	•••••	•••••	City
Cumberland & Westernport Transit Co. Potomac Edison Co	11.20	. 43	. 83	Interurban City	Utah Utah-Idaho-Central R.R. Utah Light & Traction Co	2.50 3.28	3. 28		City
United Railwaya & Elec. Co Massachusetts	• • • • • •	. 82		City	Vermont	2.51	9.51	9.51	Intercity
Berkshire St. Ry. Boston Elevated Ry.	1.49	7.71	9.11	Interurban City	Burlington Traction Co	.50	80		Interurban City
Eastern Mass. Street Ry Lowell & Fitchburg St. Ry	1,96 11:42 2.50		11.87	City Interurban Interurban	Virginia				C 1.
Middlesex & Boston St. Ry Milford & Uxbridge St. Ry.	9.88 6.00	9.88	13. 29	Interurban Interurban	Virginia Electric Pwr. Co Washington	21.06	. 81	11.66	City
Springfield Street Ry	1.23		1.23		Puget Sound Power & Light Co	1.70			City Interurban
Worcester Consolidated St. Ry	2.50 87.63			City Interurban	Seattle Municipal Street Ry	2. 79		•••••	
Michigan Dept. of Street Ry., Detroit		.::		City	West Virginia Monogabela West Penn Pub. Service Co.			1.10	
Detroit United Ry & Muskegon Grand Rapids, Grand Haven & Muskegon	14.93 63.44	14.93 63.44		City Interurban	Princeton Pwr. Co	. 25	2.28		
Ry	1.00	• • • • • •		City	Wisconsin Milwaukea Elec. Ry. & Light Co	. 14			City
Michigan Elec. Ry.	. 59	1.98		Interurban Interurban	Wisconsin Pwr. & Light Co	. 28 38. 85	1.70	1.86 1.70	Interurban Interurban
Minnesota	4.50			Interurban	Wisconsin Pub. Service Corp	2.50 8.31			
Twin City Rapid Transit Co Mississippt	. 92	• • • • • •		Interubran	Canada British Columbia Elec. Ry	1.28			City
Missiesippi Pwr. & Light Co	2.30	• • • • • •	2.30	City	Montreal & Southern Counties Ry	7.64 1.08 4.91		3.54	City City City
Kansas City Pub. Service Co	0.65 2.00		0.40 2.00	City Interurban	Montreal Tramways Co	16. 19	. 24		
St. Francois County R.R St. Louis Pub. Service Co		2.32		Interurban City	Winnipeg Elec. Co	• • • • • •	1.75	• • • • • •	City
			. 23	Interurban	Total	772.68	432. 19	313.05	

a permanent terminal at Port Chester, at the Connecticut

Electrification of steam railroad trackage totaled slightly more than 140 miles during the year just ended. Nine such projects were reported, the same number as the year before. Outstanding among these was the electrification of the Sea Beach branch of the Long Island Railroad. This company alone added more than 90 miles to its electrified trackage. Other electrification projects were comparatively small, but represent a substantial

Interchange of through freight traffic among the Long Island, the Pennsylvania and the New Haven Railroads, by means of electrically operated freight trains, commenced on July 8, when electric locomotives replaced steam locomotives in the movement of freight cars from Bay Ridge, Brooklyn, to Port Morris, in the Bronx, via the Bay Ridge division of the Long Island Railroad, and the Hell Gate Bridge Route of the New York Connecting Railroad.

This is the first step taken by the Long Island Railroad to electrify its freight lines in Greater New York. The estimated cost of electrifying the Bay Ridge division exceeds \$4,000,000.

In conjunction with this electrification the New York

Entire Abandonments in 1927

Louisiana Electric Company, Lake Charles (A) 7.55 Shawnec-Tecumsch Traction Company (A) 95.1 Mesaba Railway (B) 38.00 New Bedford & Onset Street Railway (B) 21.24 Reno Traction Company (B) 7.50 Chicago & Interurban Traction Company (B) 41.00 Hoosick Falls Railroad (B) 7.55 Allen Street Railway (C) 5.42 Jefferson Traction Company (C) 18.00 Lewisburg & Ronceverte Electric Railway (C) 6.20		Milles
Mesaba Railway (B) 38.00 New Bedford & Onset Street Railway (B) 21.24 Reno Traction Company (B) 7.50 Chicago & Interurban Traction Company (B) 41.00 Hoosick Falls Railroad (B) 7.55 Allen Street Railway (C) 5.42 Jefferson Traction Company (C) 18.00	Louisiana Electric Company, Lake Charles (A)	
Mesaba Railway (B). 38.00 New Bedford & Onset Street Railway (B). 21.24 Reno Traction Company (B). 7.50 Chicago & Interurban Traction Company (B). 41.00 Hoosick Falls Railroad (B). 7.55 Allen Street Railway (C). 5.42 Jefferson Traction Company (C). 18.00	Shawnee-Tecumseh Traction Company (A)	
Reno Traction Company (B). 7,50 Chicago & Interurban Traction Company (B). 41,00 Hoosick Falls Railroad (B). 7,55 Allen Street Railway (C). 5,42 Jefferson Traction Company (C). 18,00	Mesaba Railway (B)	
Chicago & Interurban Traction Company (B) 41.00 Hoosick Falls Railroad (B) 7.55 Allen Street Railway (C) 5.42 Jefferson Traction Company (C) 18.00	New Bedford & Onset Street Railway (B)	
$ \begin{array}{llllllllllllllllllllllllllllllllllll$		
Allen Street Railway (C) 5.42 Jefferson Traction Company (C) 18.00	Chicago & Interurban Traction Company (B)	
Jefferson Traction Company (C)	Hoosick Falls Railroad (B)	
	Allen Street Railway (C)	
Lewisburg & Ronceverte Electric Railway (C)		
	Lewisburg & Ronceverte Electric Railway (C)	6.20
Total	Total	161.97

Complete substitution of buses under same management. Complete substitution of buses under new management. Complete abandonment—no service now given.

Connecting Railroad electrified its freight tracks between Fresh Pond and Port Morris, known as the Hell Gate Bridge Route.

Another electrification project for which first steps were taken during the past year is that of the Boston, Revere Beach & Lynn Railroad, popularly known as the "Narrow Gage." The new management, recently installed, plans to electrify both the 12-mile double-track main line between Lynn and the East Boston Ferry terminal and the Winthrop loop line.

The 3-ft. gage will be retained on the entire system, totaling 34 miles of single track. The complete program will cost more than \$1,000,000 and includes the purchase of new car equipment, remodeling of all stations, installation of an overhead system and the construction of substations.

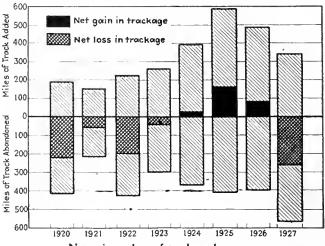
Electric operation will provide not only a faster ride but also a cleaner ride. This feature will be appreciated particularly in the tunnels on the road, where the smoke from the steam locomotives has proved in the past a nuisance to the patrons and a problem to the owners.

In order to finance the proposed improvements the directors have recommended to the stockholders that they authorize immediate application to the Department of Public Utilities for authority to issue 1,700 additional shares of stock and \$1,000,000 of general mortgage bonds of the company.

During the past year ten electric railways with a total trackage of approximately 160 miles abandoned all rail

Two of these installed bus service operation. place of car service. Bus service under different management replaced the transportation service formerly given by five of these railways. In the three remaining instances it appears that no service of any kind is now being given.

Car operation was replaced by bus operation on trackage totaling about 450 miles by electric railways which



Net gain or loss of trackage by years

continued to operate the major parts of their systems. A total of approximately 600 miles of track was definitely abandoned. Extensions to bus routes to the extent of more than 3,000 miles were made by the electric railways and the combined track and bus mileage of the local transportation systems therefore showed a substantial gain for the year. Details of the additions to bus routes are given in an article published elsewhere in this issue.

Looking back over the record of the electric railways during the past decade it is noteworthy that additions to the trackage of the industry have been considerably greater than the abandonments. A total of 4,060 miles of new track has been added, while the abandonments have amounted to only 3,800 miles. Of this latter figure 1,380 miles represent parts of railway systems where the bus has replaced the electric car. Nearly all of these abandonments were interurban or suburban track where traffic was extremely thin. In many instances it is extremely doubtful if there ever was any economic justification for its construction.

Substitution of buses under the same management over the entire system has occurred on 46 properties with 460 miles of track, or about 10 miles apiece. The majority of these railways were local lines in towns of less than 20,000 population. Complete abandonment and substitution of buses operated by other agencies has occurred on 1,180 miles of track. Included in this figure are a few medium-sized interurbans and a considerable number of small railways with less than 10 miles of track. Approximately 630 miles of track has been entirely abandoned and no service of any kind is now given. In this classification also the average size of the properties abandoned is less than 10 miles.

Summarizing the situation as-it exists today, there has been a net gain of several hundred miles in the trackage of the electric railway industry since the beginning of During this period about 18,000 miles of bus route has been added. Thus the present total for track and bus together is approximately 64,000 miles, or nearly 50 per cent greater than the pre-war mileage of the local transportation industry.

Passenger Car Purchases

Table I—Number and Types of Cars Purchased During 1927

- mondood Daini	6 -/-/		
U.S.	Extrater- ritorial		
Number of companies reporting purchases of new cars 53	2	6	61
One-man cars, 28 ft. body One-man cars with bodies longer			
than 28 ft.: Single truck	• • •	1 4	17 195
One-man, two-man cars 170 Two-man cars (surface) 252	 8 6	20 86	198 344
Motor cars for rapid transit lines	.,		70
Service and miscellaneous cars. 68	···	• • • •	(8
Total cars for city service 767 INTERURBAN SERVICE	14	111	892
One-man, single-truck cars	• •		31
Two-man cars			8 59 13
Motor cars for train service 10 Express and freight cars	• •		10 23
Total for interurban service, 415			272 416
Electric locomotives	1	<u>i</u>	40
Total cars and electric loco- tives	15	113	1,348

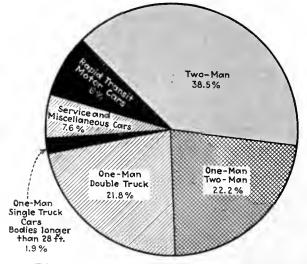
RDERS for a total of 1,348 cars and electric locomotives were placed during 1927. Except for the year 1921, when only 1,276 cars and electric locomotives were bought, the number for 1927 is the lowest for any year since 1907, when ELECTRIC RAILWAY JOURNAL began first to compile these statistics. The buying was confined to a comparatively few railways, there being only 61 properties that reported purchases of new rolling stock. These are divided 53 in the United States, two extraterritorial and six in Canada.

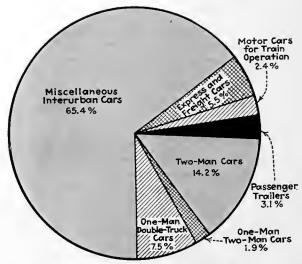
There were seventeen railways that purchased twenty

Low in 1927

Much attention was given during the year to experimental development of passenger cars and trucks. There were 824 city type passenger cars, 121 interurban passenger cars, 40 electric locomotives and 363 freight and miscellaneous cars ordered during 1927. This is a low volume for new electric railway rolling stock

or more passenger cars. These seventeen railways account for nearly 72 per cent of the total passenger car orders. The number of railways is the same as for 1925, but a decrease of five from 1926, when 22 railways reported purchases of twenty or more cars. The largest order during 1927 was that of the Department of Street Railways for the city of Detroit, which purchased 125 double-truck two-man cars for city service. The work of building these cars was divided among three car plants. The Springfield Street Railway, Springfield, Mass., bought 51 double-truck one-man cars and the St. Louis Public Service Company built the same number of doubletruck, two-man cars. Four railways purchased 50 passenger cars. The Eastern Massachusetts Street Railway and the Worcester Consolidated Street Railway each bought 50 double-truck one-man, two-man cars; the Montreal Tramways 50 double-truck two-man cars and the New York Rapid Transit Corporation 50 triplex units for subway service and one supply car. These triplex units consist of three car bodies mounted on four trucks. The end bodies are each 47 ft. 11½ in. long and the center section is 41 ft. $1\frac{3}{4}$ in. long. The combined length is 137 ft. 3 in. over all and seats are provided for 160 passengers. Companies purchasing twenty or more cars are listed in Table III.





Diagrams showing the proportion that each type of car bears to the total purchased during 1927
At left, city cars; at right, interurban cars.

Table II—Special Comparison of New Rolling Stock Ordered by Year	Table II—Special	Comparison of	New Rolling	Stock	Ordered by Y	'ears
------------------------------------------------------------------	------------------	---------------	-------------	-------	--------------	-------

	1927	1926	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916
Number of railways reporting new cars	61	108	94	119	167	145	94	172	160	140	182	250
CITY SERVICE Number of one-man cars (28-ft. body S. T.). Number of one-man cars other than 28-ft. body. Number of one-man, two-man cars. Number of two-man passenger motor cars*. Number of passenger trailers. Service cars.	212 198 414	66 144 574 456 9 52	55 74 512 405 8 70	103 96 1,224 537 25 44	312 183 1,076 1,097 247 121	772 227 471 1,290 150 103	565 383 111 47	1,699 847 343 104	1,383 635 111 31	1,068 130 (a)	280 1,316 402 (a)	187 2,731 128 (a)
Total cars city service	892	1,301	1,124	2,029	3,036	3,015	1,106	2,993	2,160	1,842	1,998	3,046
INTERURBAN SERVICE Number of one-man cars. Number of one-man, two-man cars. Number of two-man motor cars*. Number of passenger trailers. Number of freight, express and miscellaneous cars	31 8 69 13 295	43 45 172 49 212	70 207 40 168	61 38 435 4 1,494	56 38 330 3 474	40 9 122 16 302	103 26 34	195 32 361	96 32 141	200 55 (a)	158 27 (a)	303 71 (a)
Total cars interurban service. Total number of cars. Number of electric locomotives.	416 1,308 40	521 1,822 60	488 1,612 47	2,032 4,061 31	901 3,937 92	489 3,538 34	163 1,269 7	588 3,581 17	269 2,429 18	255 2,375 44	185 2,406 49	374 3,911 31

^{*}Includes motor and trail cars for subway, elevated and train service. (a) Not available.

The statistics of new rolling stock given in the tables and charts herewith when analyzed in detail show decreases for all types except one-man double-truck passenger cars for city service, two-man cars for city operation and service, freight, express and miscellaneous cars. There were 363 cars in the latter class, divided 68 service and miscellaneous cars for city service, 23 express and freight cars and 272 miscellaneous cars for interurban service. The total of these classes for 1926 was 264 cars, so there is an increase of 99 cars for 1927. This increase is due to an order for 250 dump cars and ten flat cars placed by the Illinois Traction, Inc.

Interest naturally centers in passenger car purchases. Comparison of the years 1925, 1926 and 1927 shows a total of 945 passenger cars ordered during 1927, as compared with 1,558 in 1926 and 1,374 in 1925. There were 754 city surface passenger cars bought in 1927, as compared with 932 in 1926; 70 rapid transit motor cars purchased in 1927, as compared with 317 in 1926, and 121 interurban passenger cars bought during 1927, as compared with 309 in 1926. The only classes of passenger cars that show an increase for 1927 over 1926 are double-truck one-man cars for city service and two-man cars for city service, there being 195 double-truck oneman cars purchased in 1927, as compared with 121 for 1926, and 344 two-man city cars bought in 1927, as compared with 139 in 1926. Comparative numbers of the various types of cars purchased during the last twelve years are given in Table II.

Special comparisons of new cars purchased during 1927 are given at the beginning of this article in Table I and the diagrams on page 56 show at a glance just what types of cars are being bought in greatest proportion. Of cars purchased for city service 344, or nearly 39 per cent, are of the two-man type. The number of double-truck one-man cars and one-man, two-man cars are nearly the same, there being 195 of the former and 198 of the latter. The number of each type constitutes approximately 22 per cent of the total cars for city service. These three types of city passenger cars constitute 82.5 per cent of the total, the remainder being made up of seventeen single-truck one-man cars, 70 motor cars for rapid transit lines and 68 miscellaneous cars.

Of the interurban cars, miscellaneous service cars constitute more than 65 per cent of the total. The two-man type for interurban passenger service predominated, there being 59 of these bought, or slightly more than 14 per cent of the total. There were purchased 31 one-man interurban cars, 7.5 per cent of the total; 23 express and freight cars, 5.5 per cent; thirteen passenger trailers, 3.1 per cent, and ten motor cars for train operation, 2.4 per cent. Of the cars reported for interurban service, eight,

Table III—Railways Purchasing 20 or More Passenger Cars

2 00000.5	or Guro
Department of Street Railways, Detroit Springfield Street Railway. St. Louis Publio Service Company Eastern Massachusetta Street Railway. Montreal Tramways New York Rapid Transit Corporation	125 City, double-truck, 2 man 51 City, double-truck, 1 man 51 City, double-truck, 2 man 50 City, double-truck, 1-2 man 50 City, double-truck, 2 man 50 Triplex units, 3 bodies on 4 trucks
Worcester Consolidated Street Railway. Georgia Power Company	1 Supply car 50 City, double-truck, 1-2 man 40 City, double-truck, 1 man
Chicago, North Shora & Milwaukee Rail- road	15 Interurban double-truck motor cars
	10 City, double-truck, 1-2 man 2 Interurban dining cara 1 Interurban parlor car 10 Freight trailers
Dominion Power and Transmission Com- pany. Market Street Railway. Twin City Rapid Transit Company. Chicago, South Shore & South Bend Rail-	36 City, double-truck, 2 man 26 City, double-truck, 2 man 25 City, double-truck, 1-2 man
road	10 Interurban double-truck motor cars 10 Interurban double-truck trailers 5 Cabooses
Houston Electric Company Hudson & Manhattan Railroad New Orleans Public Service, Inc. Ottawa Electric Railway	20 City, double-truck, 1 man 20 Rapid transit motor cars 20 City, double-truck, 2 man 20 City, double-truck, 1-2 man

Table IV—Electric Locomotives Ordered in 1927

Name of Railway	Number	Weight Tons	Length Over All Ft. In.
Chicago, North Shore & Milwaukee R.R	2 2 2	65 80 50	40— 0 39— 0 35— 6
Cincinnati, Hamilton & Dayton Ry	2	51 205	50— 0 73— 9
Hershey Cuban Ry. (Cuba) Houston, North Shore Ry Long Island R.R.		60 50 160	37— 4 35— 6 64—11
	1	25 100 80	13— 6 45—10 40— 0
Montreal & Southern Counties Ry	i 5 1	60 1 7 0 50	36— 0 68— 6 37— 4
Sacramento Northern Ry Terre Haute, Indianapolis & Eastern Traction Co	1	60 45	35—6
Total	40		

Table V—New Rolling Stock Ordered Since 1907

	Pass	senger Cars——		Electric	
Year	City	Interurban	Cars	Locomotives	Total
1907	3,483	1,327	1,406	(a)	6,216
1908	2,208	727	176	(a)	3,111
1909	2,537	1,245	1,175	(a)	4,957
1910	3,571	990	820	(a)	5,381
1911	2,884	626	505	(a)	4,015
1912	4,531	783	687	(a)	6,001
1913	3,820	547	1,147	(a)	5,514
1914	2,147	384	479	(a)	3,010
1915	2,072	336	374	(a)	2,782
1916	3,046	374	491	31	3,942
1917	1,998	185	223	49	2,455
1918	1,842	255	278	44	2,419
1919	2,129	128	172	18	2,447
1920	2,889	227	465	17	3,598
1921	1,059	129	81	7	1,276
1922	2,912	187	405	34	3,538
1923	2,915	427	595	92	4,029
1924	1,985	538	1,538	31	4,092
1925	1,054	320	238	47	1,659
1926	1,249	309	264	60	1,882
1927	824	121	363	40	1,348

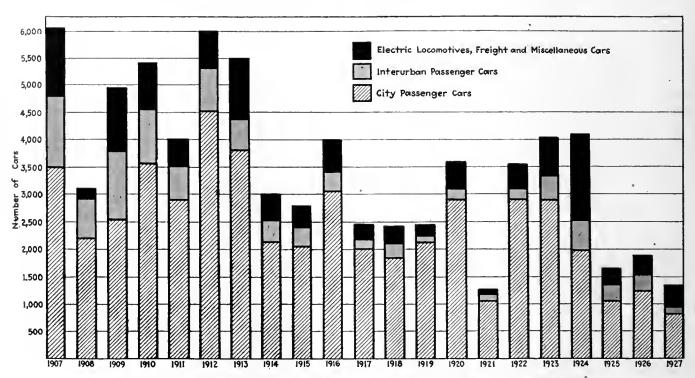
(a) Included in "Freight and Miscellaneous Cars."

or about 2 per cent of the total, were classified as one-man two-man type.

The trend toward one-man operation, which was introduced with the Birney safety car and later through the purchase of double truck one-man cars and one-man, two-man cars, is shown in the chart on page 59. One-man single-truck cars with 28-ft. bodies, the original safety cars, made their first appearance in 1916, when 187 were purchased. This type of car increased in popularity up to and including 1920, when a total of 1,699 cars of this type were bought. Purchases of all types of

adopted this year will make it more convenient to locate a particular electric railway for detailed information than with the other arrangement. Reports from railways in the Dominion of Canada and districts outside continental United States are grouped separately. In addition to listing the number of cars ordered by the individual companies, the table shows the class of car and type of service. It also gives data as to length, seating capacity, weight and number of motors for the cars.

The greatest number of cars purchased by railways in a single state was for Illinois, where a total of 340 cars



Graphical analysis of city cars, interurban cars and total cars and electric locomotives purchased during the past 21 years

cars in 1921 took a decided drop and the number of single-truck one-man cars purchased in that year was but 565. However, they constituted nearly 60 per cent of the total motor cars purchased for city service during that year. During the year 1922 there was a reaction away from the use of single-truck cars and double-truck oneman and one-man, two-man cars made their first appearance. There were 772 single-truck one-man cars with 28-ft. bodies, 227 one-man cars with bodies longer than 28 ft. and 471 one-man, two-man cars purchased in 1922. Since that time the number of single-truck one-man cars bought each year has decreased and their place has apparently been taken by one-man and one-man, two-man double-truck cars. The greatest number of one-man, two-man cars was purchased during the year 1924, when a total of 1,224 were reported. Since then purchases of all types of cars have fallen off. Of the motor-passenger cars purchased for city service during 1927, 45.6 per cent were two-man cars, 26.3 per cent were classified as one-man, two-man cars, 25.8 per cent one-man doubletruck cars, 2.3 per cent one-man single-truck cars.

Details of rolling stock ordered by individual companies are given in Table IX. In this table the railways are arranged alphabetically for each state and the states in turn are arranged alphabetically. This arrangement is somewhat different than the method followed in previous years of grouping the states according to geographical divisions. It is believed, however, that the grouping

were purchased. Of these, however, 260 were miscellaneous dump and flat cars for interurban service. The largest purchases of passenger cars were in the state of Massachusetts, there being a total of 161 passenger cars for city service reported. The total of all types of cars for city service reported. for the state was 194. The state of Michigan was brought into third place in the number of car purchases by the order of 125 cars by the Department of Street Railways for the city of Detroit. The total number of new cars reported by railroads in Michigan was 136. New York State is in fourth place, with a total of 93 new cars reported. Pennsylvania and Ohio, which in previous years have been leaders in the number of cars purchased, were far behind during 1927, there being but 34 cars reported by railways in Pennsylvania and but fifteen for the railways in Ohio.

For convenience in comparing rolling stock purchases during the past 21 years, and to show at a glance the number of cars purchased as divided between city and interurban passenger cars and freight, express service and miscellaneous cars, Table V has been prepared. This gives the total number of cars ordered each year beginning with 1907. Rolling stock purchases are divided into four classes: First, city passenger cars; second, interurban passenger cars; third, freight, express and miscelcellaneous cars, and, fourth, electric locomotives. In this classification cars for electrified steam railroad suburban service are included with interurban cars. The miscel-

laneous cars include service cars, snow plows, sweepers, work cars, etc.

In addition to this table, the trend of purchases is shown by diagrams. The total rolling stock purchased for each year is divided into city passenger cars, interurban passenger cars and miscellaneous express, freight, service and electric locomotives. High points of purchases are shown by the chart for the years up to and including 1913, again for 1916, 1920, and for the years 1922, 1923 and 1924.

A special comparison of cars ordered during the last twelve years is given in Table II. Cars are listed separately for city and interurban service and each class divides the various cars according to type. It is interesting to note how the number of single-truck cars purchased yearly increased up to 1920. Since then the swing in car purchases has been toward the use of longer bodies with double trucks. The trend for each class of car has been discussed in connection with each individual classification.

Purchases of electric locomotives during 1927 are

Table VI—Dimensions of One-Man Double-Truck City Cars Built in 1927

	No.			
	Cars	Length,	Weight,	Number
Railway	Ordered	Ft. In.	Tons	Seats
Washington Railway & Electric Co	12	42 3	20.10	49
Georgia Power Co	40	46 4	18.90	48
Macon Railway & Light Co	12	42-10	15.00	40
Chicago & Joliet Electric Ry	1	41 0	12.00	50
Gary Rys	9	44-0	18.50	52
Springfield Street Ry	50	40— 8	18.25	45
Springfield Street Ry	1	40-8	12.65	44
Detroit United Ry	10	42-10	14.90	49
Butte Electric Ry	3	4410	16.00	44
Brill 1928 Model Car		40 8	15.00	45
Pittsburg Rys	2	45 0	15.00	36
El Paso Electric Co	7	39-11	16,25	49
Galveston Electric Co	.4	45— 0	18.00	48
Houston Electric Co	20	44-113	18.00	57
Northern Texas Traction Co	10	3911	17.00	40
Milwaukee Electric Ry. & Light Co	10	45-0	17.88	54
Saskatoon Municipal Ry	4	39—11	14.67	41
	196			
Maximum		46 4	20.10	54
Minimum		39—11	12.00	36
Weighted average		43— 8	17.70	47

Table VII—Dimensions of One-Man, Two-Man City Cars Ordered in 1927

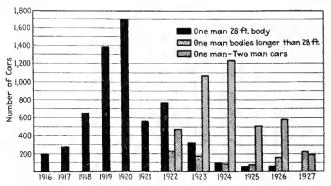
	ING.			
3	Cars	Length,	Weight,	Number
Railway	Ordered	Ft. In.	Tons	Seats
Chicago, North Shore & Milwaukee R.R.	10	51-0	20.00	56
East St. Louis & Suburban Ry	5	46 7	17.00	48 48 44
Boston Elevated Ry		45 0	15.75	48
Eastern Massachusetts Street Ry	50	4311	19.45	44
Worcester Consolidated Street Ry	50	40— 8	17.65	44
Twin City Rapid Transit Co	25	45 6	14.00	50
Beaver Valley Traction Co	8	44 4	18.50	50
Knoxville Power & Light Co	12	43-2	19.00	48
Honolulu Rapid Transit Co	8	42- 9	16.00	48
Ottawa Electric Ry	20	45 — 0	19.25	47
	198			
Maximum		51-0	20.00	56
Minimum			14.00	44
Weighted average			18.00	47

Table VIII—Dimensions of Two-Man City Cars Ordered in 1927

	INO.			
	Cars	Length,	Weight,	Number
Railway	Ordered	Ft. In.	Tons	Seats
Market Street Ry	26	47 0	19.00	50
Municipal Railway of San Francisco,	10	47 1	25.50	50
Chicago & West Towns Ry	14	45 0	17.50	48
Interstate Public Service Co	6	45 6	20.00	52
New Orleans Public Service, Inc	20	48 2	19.50	52
Department of Street Railways, Detroit	125	48 51	18.37	52
St. Louis Public Service Co	50	50 8	20.60	60
St. Louis Public Service Co	1	50-8	16.00	60
Porto Rico Ry., Light & Power Co	6	45-11	15.00	57
Dominion Power & Transmission Co	36	40-11	18.50	48
Montreal Tramways	50	46 2	16,00	42
	344			
Maximum		50 8	25.50	60
Minimum		4 0—11	15.00	42
Weighted average		47— 6	18.61	48

listed in Table IV. The total number of electric locomotives bought is 40, as compared with 60 for 1926 and 47 for 1925. The Long Island Railroad was the largest purchaser with fifteen 160-ton, one 100-ton, one 80-ton and two 25-ton locomotives. The New York, New Haven & Hartford Railroad purchased five 170-ton locomotives, and the remaining sixteen locomotives purchased during 1927 are divided among ten electric railways.

The last column of Table IX shows the number of cars junked during the year. During 1927 a total of 1,597 cars were reported by electric railways as being junked. By grouping these into classes it is found that they consisted of 1,374 city passenger cars, 81 interurban passenger cars and 142 miscellaneous service, freight



Relative purchases of one-man and one-man, two-man cars for the last twelve years

work and snow plows. There were 1,626 cars junked during 1926, and of these 1,402 were city passenger cars.

An accompanying diagram shows graphically the number of cars junked during the past six years. Comparison of the figures shown in this diagram indicates that the number of cars junked during 1927 exceeded those for the years 1922 and 1925. The greatest number of cars reported junked during any one year was in 1924, when a total of 1,853 cars were reported. New cars purchased for replacements during that year, however, were more than three times the number for 1927.

In analyzing the various one-man, one-man, two-man and two-man cars ordered for city service during 1927 it is found that they run quite uniform in length, weight and seating capacity. Detailed figures are given in Tables VI, VII and VIII. The length of the one-man double-truck cars ordered for city service varies from 39 ft. 11 in. to 46 ft. 4 in. The weighted average length for all cars of this type is 43 ft. 8 in.

Weights of this class of cars vary from 12 tons to 20.1 tons. The 12-ton car is the Chicago & Joliet car with aluminum body. The Springfield car with worm drive is reported as weighing 12.65 tons. Aside from these two cars the minimum weight is 14.7 tons. The weighted average for all cars of the one-man double-truck type is 17.7 tons. Seating capacities of one-man double-truck cars ordered for city service vary from 36 to 54, with a weighted average of 47 seats.

Cars reported as of the one-man, two-man type are of the same average size as one-man cars. Weights are just a little greater. Lengths vary from 40 ft. 8 in. to 51 ft. and the weighted average length for all cars of this type ordered in 1927 is the same as for one-man cars, namely, 43 ft. 8 in. Weights of one-man, two-man cars varied from 14 tons to 20 tons, with a weighted average for all cars of this class of 18 tons. Seating capacities varied from 44 to 56 and the weighted average was 47 seats, the same as for the one-man class.

Table IX—Details of Rolling Stock Ordered During 1927

				-8						8	
Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck		Total Wt. Light Tons	No.	Seating Capacity	One or Two Man	No. Cars Junked During Year
Aiabama											
Alabama Power Co											14 CM 10 CDT
Mobile Light & R.R. Co			1								13 CDM 1 CDM
Arkansas Southwestern Gas & Electric Co											I CSM
California Bakersfield & Kern Electric Ry											{ 3 CDM
Key System Transit Co											2 CSM 23 CM
Market Street Ry	26 10	Passenger Passenger	City City	Motor Motor	Double Double	47— 0 47— 1	19.00 25.50	4	50 50	Two Two	21 CDM
Pacific Electric Ry			,								16 IS
Southern Pacific Co											28 IF 7 CDM 5 CSM
Colorado Springs & Internrban Ry		**********									3 CDM 8 IM 5 IT
District of Columbia Washington Railway & Electric Co	12	Passenger	City	Motor	Double	42 3	20,10	4	49	One	{ 40 CDM 1 CS
Georgia Georgia Power Co	40 12	Passenger Passenger	City City	Motor Motor	Double Double	46— 4 42—10	18.90 15.00	4 4	48 40	One One	
Illinois					ļ.						
Aurora, Elgin & Fox River Electric Co											31 CSM 9 CDM
Chicago, Aurora & Elgin R.R. Chicago & Joliet Electric Ry.	15 1 15	Passenger Passenger Passenger	Interurban City Interurban	Motor Motor Motor	Double Double Double	55— 31 41— 0 55— 31	56.00 12.00 51.00	4 4 4	54 50 52	One One Two	l IDM
Chicago, North Shore & Milwaukee R.R	10 2 1	Passenger Dining Parlor	City Interurban Interurban	Motor Trailer Trailer	Double Double Double	51— 0 55— 31 55— 31	20.00 42.50 40.00	4	56 24 17	Both Train Train	5 IDOT
Chicago & West Towns Ry	10 14 5	Freight Passenger Passenger	Internrban City City	Trailer Motor Motor	Double Double Double	60— 0 45— 0 46— 7	25.00 17.50 17.00	4 4	48 48	Two Both	I IDM 2 CSM
Illinois Power Co											2 CSOM 2 CST
Illinois Power & Light Co	1 1										30 CSM 4 CSO 4 CS
Illinois Traction, Inc	250 10	Dump Flat	Interurban Interurban	Trailer Trailer	Double	42-10	25.50				
Rockford & Interurban Ry	17	Passenger	Internrban	Motor	Donble	45— 6		4	52	One	
Indiana	10	Passenger	Interurban	Meter	Double	60 0	65.00	4	48		5 I M
Chicago, South Shore & South Bend R.R	10	Passenger Caboose	Interurban Interurban	Trailer Trailer	Double Double	60 0	48.50 19.00		46	Two	IIT 8 F
Evansville & Ohio Valley Ry	,		City	Motor	Double	44— 0			52		5 IDM
Gary Rys	2 6 10	Passenger Passenger Passenger Freight	Interurban City Interurban	Motor Motor Trailer	Double Double Double	44 84 45 6 41 14	18.50 20.00 20.00 15.50	4 4 4	52 46 52	One Roth Two	9 CDM
lowa	3	Work	Internrban	Motor	Double	45 0	35.00	4			
Des Moines City Ry	2	Dump	City	Trailer	Double	37— 6					
Joplin & Pittsburg Ry		_								• • • • • • • • • • • • • • • • • • • •	{ II CSM 2 IDM
Kansas City, Leavenworth & Western Ry	4	Passenger	Interurban	Motor	Double	45— 6	17.50	4	52	One	6 CM
Louisiana Electric Co	20	Passenger	City	Motor	Double	48 2	19.50		52	Two	10 CSM 1 CSM
Shreveport Rys											3 CSM
United Railways & Electric Co			• • • • • • • • • • • • • • • • • • • •								2 CSM 49 CDM
Massachusetts Boston Elevated Ry	10 19 7	Passenger Snow plow Dump	City City City	Motor Motor Motor	Double Double Double	45— 0 46— 2 ³ / ₄ 40— 0	15.75 34.00	4 .	48	Both	
Eastern Massachusetts Street Ry	50	Passenger	City	Motor	Double	43—11	25.00 19.45	4	44	Both	67 CDM 13 CSM 11 SP
Fitchburg & Leominster Street Ry	6 50	Passenger Passenger	Interurban City	Motor Motor	Double Double	36—10 40— 8	16.05 18.25	4 4	40 45	Both One	i i cs
Union Street Ry. (New Bedford)		Passenger Snow plow Passenger	City City City	Motor Motor Motor	Double Double Double	40— 8 43— 4½ 40— 8	12.65 20.87 17.65	4 4	44	One .	
Michigan Detroit United Ry	10	Passenger Freight	City Interurban	Motor Trailer	Double Double	42—10 48— 8	14.90 21.43	4	49	One .	
Department of Street Rys. (Detroit)	125	Passenger	City	Motor		48— 5}	18.37	4	52	Two	4 CDM 1 CSM 3 CM 11 IM

Table IX-Details of Rolling Stock Ordered During 1927-(Continued)

			·				8				
Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck		Total Wt. Light Tons	No.	Seating Capacity	One or Two Man	No. Cara Junked During Year
Minnesota											
Duluth Street Ry Twin City Rapid Transit Co	25	Passenger	City	Motor	Double	45— 6	14.00	4	50	Both	1 CM
Missouri Kansas City, Leavenworth & Western Ry	4 2 2	Passenger Dump Dump	Interurban City City	Motor Motor Motor	Double Double Double	45— 6 40— 0 30— 0	26.00 24.00	4 4 4	52	One	
Kansas City Public Service Co	2 2 5 2	Dump Dump Crane	City City City	Trailer Trailer Motor	Double Double Double	40— 0 30— 0 44— 0	16.00 16.45 37.00				
Misacuri Power & Light Co	50	Passenger Passenger		Motor Motor	Double Double	50— 8 50— 8	20.60	4 4	60	Two	5 CSM 9 CM 1 CT
Southwest Missouri R.R	1	Passenger	Interurban		Double	40 4		4	42	One	
Butte Electric Ry Nehraska	3	Passenger	City	Motor	Double	44—10	16.00	4	44	One	
Lincoln Traction Co										• • • • • • • • • • • • • • • • • • • •	{ 15 CDM 1 IE
Coast Cities Ry	10	Sweeper	City	Motor	Single						19 CO 86 CM 14 CS
New York Fonda, Johnstown & Gloversville R.R. Hudson & Manhattan R.R. Jamestown Street Ry.	20	Sweeper Passenger	City City	Motor Motor	Double Double	4!— 0 51— 0	18.00 37.00	4 2	44	Train	CM
Long Island R.R	10	Passenger Baggage	Interurban Interurban	Motor Motor	Double Double	69 	63.85 63.50	2 2	100	Train Train	6 IDM
New York Rya	50‡		City	Motor	‡Four	137— 0	103.60	4	160	Train	8 CDM 12 CSM
Naw York, Westchester & Boston Ry	10	Supply Passenger	City Internrban	Motor Motor	Double Double	48— 3 72— 6	35.00 63.45	2	80	Two	10 CO
Third Avenue Ry United Traction Co. (Alhany)											37 CSM 9 CSM
North Carolina Carolina Power & Light Co	6	Passenger	City	Motor	Single	32-10	7.00	2	40	One	6 CM 1 CS
Tide Water Power Co North Dakota											CDM
Fargo-Moorhead Street Ry											8 COT
Cincinnati Street Ry		Duma			D11		35.00				190 CSM
Cleveland Ry	8 4 1	Dump Dump Sweeper	City City City	Motor Trailer Motor	Double Double Single	40— 0 40— 0 27— 0	25.00 17.00 10.00	4			5 CDM
New Castle Electric Street Ry Northern Ohio Power & Light Co	2	Dump	City	Trailer	· Double	40 0	17.00			• • • • • • • • •	CM CS 25 CM
Portsmouth Public Service Co Oklahoma								• • • • • • • •			1 CDM
Shawnee-Tecumseh Traction Co											9 CSM
Pennsylvania Beaver Valley Traction Co	8	Passenger	City	Motor	Doubla	44 4	18.50	4	50	Both	8 CDM 25 CDM
Philadelphia Rapid Transit Co		Passenger	To to on hom		Daubla	50 4	22.00	4			I IF
Pittsburgh Rys	5 2 15	Passenger Passenger Freight	Interurhan City Interurban Interurban	Motor Motor Motor Motor	Double Double Double Double	50— 6 45— 0 52—10 50— 0	32.00 15.00 23.00 22.50	4 4 4	55 36 52	Two One Two	4 CSM
West Penn Rys	2	Flat Line	Interurban Interurban	Trailer Motor	Single Double	20— 0 48— 8	14.00 21.00	4			
United Electric Rys. (Providence)		• • • • • • • • • • •									$\left\{\begin{array}{c} 280~\mathrm{CM} \\ 12~\mathrm{CS} \end{array}\right.$
South Carolina Power Co Tennessee										• • • • • • • • • • • • • • • • • • • •	22 CM
Johnson City Traction Corp Knoxville Power & Light Co Memphia Streat Ry.	12	Passenger	City	Motor	Double	43 2	19.00	4	48	Both	2 CM 48 CSM
Texas El Paso Electric Co	7 4	Passenger Passenger	City	Motor	Double	39	16. 25 18. 00	4 2	49 48	One One	5 CSM
Salveston Electric Co	20	Passenger Passenger	City City City	Motor Motor Motor	Double Double Double	44—113 39—11	18.00 17.00	4 4	57 40	One One One	I IDM
Utah Utah Light & Traction Co											10 CDM
Vermont Burlington Traction Co											4 CSM
Virginia Electric & Power Co	10	Passenger	City	Motor	Single	29 0	18.00	4	44	One	5 CSM
Washington Puget Sound Power & Light Co											A CM 8 IF
Facoma Municipal Belt Line		,									4 CSM

Table IX—Details of Rolling Stock Ordered During 1927—(Concluded)

Name of Company	No.	Class	City or loterurban	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Wt. Light Tons	No.	Seating Capacity	One or Two Man	No. Cars Junked During Year
West Virginia											f 4 CSM
Wheeling Traction Co											IDM IDS
Wisconsin Milwaukee Electric Ry, & Light Co	4	Passenger Passenger	Interurban		Double	45;— 0 53— 5	17.88 46.00	4 4	54 48	One Two	6 5 CSM
Wisconsin Public Service Corp	l										3 CM 3 IM
Extraterritorial											
Hawaii Hooolulu Rapid Transit Co	8	Passenger	City	Motor	Double	42 9	16.00	4	48	Both	
Porto Rico Ry., Light & Power Co	6	Passenger	City	Motor	Double	45—11	15.00	4	57	Two	17 CDM
Dominion of Canada											
British Columbia . British Columbia Electric Ry	ı	Port. Sub. Stn.	Interurban	Trailer	Double			• • • • • • •			10 IF
Onlarlo Dominion Power & Transmission Co	36 ! 20	Passenger Passenger Passenger	City City City	Motor Motor Motor	Double Single Double	40—11 33— 0 45— 0	18.50	4 2 4	48 40 47	Two One Both	16 CSM 10 CM
Quebec Montreal Tramways Co Quebec Ry., Light, Heat & Power Co Sherbrooke Ry. & Power Co			City	Motor	Double		16.00		42	Two	23 CSM 3 CSM 1 CSM
Saskatchewan Saskatoon Municipal Ry	4	Passenger	City	Motor	Double	39—11	14.67	4	41	One	

ABBREVIATIONS FOR TYPES OF CARS JUNKED

C-City cars	
CS-City, single truck	
CD-City, double truck	
CM—City, motor cars	
CT—City, trailer	
CO-City, open	
OT_City open trailer	

CO—City, open COT—City, open, trailer CSM—City, single truck, motor CST—City, single truck, trailer
CDM—City, double truck, motor
CDT—City, double truck, trailer
CSO—City, single truck, open
CSOM—City, single truck, open, motor
SP—Snow plow
I—Interurban cars

IS—Interurban service cars IE—Interurban, express IF—Ioterurban, freight IM—Ioterurban, motor IT—Interurban, trailer

IDM—Interurban, double truck, motor IDOT—Interurban, double truck, open trailer

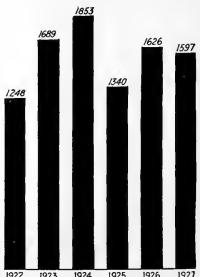
The two-man passenger cars ordered for city service in 1927 were larger than the two other types. Lengths of two-man city cars varied from 40 ft. 11 in. to 50 ft. 8 in. and the weighted average length for all cars of the class is 47 ft. 6 in. Weights of two-man city cars varied from 15 to $25\frac{1}{2}$ tons and the weighted average is 18.6 tons. Seating capacities varied from 42 to 60 with an average of 48. The accompanying summary shows weighted averages for the three types of city passenger cars purchased in 1927 compared with average city cars purchased in 1926.

Average Double-Truck Passenger Cars Purchased for City Service in 1927

	Length	Weight, Tons	Seats
One-man double-truck		17.7 18.0	47 47
One-man, two-man	47 ft. 6 in.	18.6	48
Average of city cars purchased in 1926	43 ft. 5 in.	17.36	44

In general design cars ordered during 1927 have been particularly distinctive and have shown a decided tendency toward de luxe appearance and accommodations. Never before in the history of the industry has so much attention been devoted to improving car appearance and the attractiveness of furnishings. The various car manufacturers have spent large sums of money in developing improved types of cars and trucks, and several have built experimental cars without orders. Trucks with worm and double reduction drive are being tried to permit the use of small high-speed motors and to reduce weight and noise. Particular attention has been given to increasing rates of acceleration and braking.

The statistics which have been assembled and are given in the accompanying tables of rolling stock were obtained from replies to the questionnaires sent to all electric railways in the United States and Canada.



Number of cars reported as junked during the last six years

Replies were received from more than 90 per cent of all the properties addressed. Through the courtesy and co-operation of the various car manufacturers, lists of cars built by them during the year were furnished so that the replies received from railways could be checked very carefully. In a few cases where replies were not received from electric railways themselves the information furnished by the car manufacturers has been used. Replies were received

from all car manufacturers. In addition to the information obtained from these two sources the files of ELECTRIC RAILWAY JOURNAL have been gone over carefully to check and verify figures. These include car orders contemplated as well as actually placed. Particular care has been used to verify figures which appeared doubtful.

Expansion of Bus Operation

Continued During Past Year

Number of buses operated by electric railways increased nearly 20 per cent. Purchases of new equipment were slightly less than the year before. Bus route extensions made in 1927 total more than 3,000 miles

ROWTH of bus operation by the electric railways continued during 1927 at about the same rate as in the preceding year. The number of buses increased from 7,749 at the beginning of the year to 9,229 at its close. This was an expansion of approximately 20 per cent. The number of electric railways engaged in bus operation increased from 333 a year ago to 351 at the present time. Extensions of nearly 3,200 miles in the length of bus routes operated by the railways occurred during the past year, bringing the total to more than 18,000 miles. This increase was substantially larger than that of 1926, and represented a growth of slightly more than 20 per cent.

Buses purchased by the electric railways in 1927 totaled 1,801. Of this number about 95 per cent were bought new, while the remainder were second-hand vehicles acquired with the purchase of bus lines already in operation. In all, 147 electric railways reported the purchase of additional bus equipment last year. The number of railways making such purchases as well as the number of vehicles bought was slightly less than in 1926. A general tendency toward smaller and lighter vehicles was

evident in the orders last year.

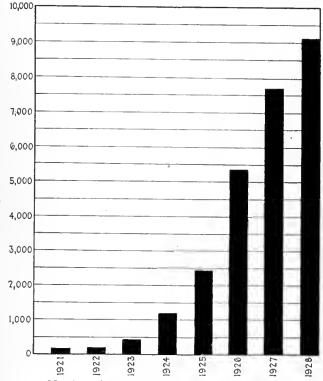
During the past year about 400 buses were scrapped compared with 160 scrapped in 1926. These figures included buses sold, traded in, converted to other uses and disposed of in various ways. While the net increase during the year in the number of buses operated is approximately equal to the difference between the number purchased and the number scrapped, exact calculations are impossible, because of the time which elapsed between the placing of orders for bus equipment and its actual delivery. For example, buses ordered in 1926 and delivered in 1927 appear on the record as an increase in the number of vehicles owned, although they are not included in the purchases for the year just ended.

The largest purchaser was the Public Service Railway of New Jersey and the affiliated Public Service Transportation Company, which bought a total of 316 buses during 1927. The next largest addition was that of 205 buses by the Philadelphia Rapid Transit Company. Other large purchasers include the Toronto Transportation Commission, 70; Cleveland Railway, 50; New York & Stamford Railway, 50; the associated Shore Line and Southwestern Michigan Motor Coach Companies, 43; the United Railways & Electric Company of Baltimore, 37; Monongahela West Penn Public Service Company, 37; International Railway, 33; Montreal Tramways, 31; Worcester Consolidated Street Railway, 30; Los Angeles Railway, 29; United Traction Company of Albany, 27; Virginia Electric & Power Company, 25; Illinois Power

& Light Company, 24; Connecticut Company, 23, and the Pittsburgh Railways, 23.

Approximately 85 per cent of the buses bought last year were equipped with mechanical drive. The figures show that about 280 vehicles, or 15 per cent of the total, were equipped with gas-electric drive. This ratio is very nearly the same as that which prevailed in 1926.

De luxe and semi-de luxe buses were prominent among



Number of buses operated by electric railways

the purchases last year. A total of approximately 250 such vehicles was ordered. The largest purchaser of this type of equipment was the Philadelphia Rural Transit Company, subsidiary of the Philadelphia Rapid Transit Company. The Toronto Transportation Commission, which has been very successful in the operation of de luxe buses under the auspices of its subsidiary, the Gray Coach Lines, Ltd., bought 30 more vehicles of this type. The Pittsburgh Railways bought 23 de luxe buses for use in express service at a higher fare. Other large purchasers of de luxe bus equipment include the Shore Line Motor Coach Company, 21; Charleston Interurban Railway, 16; Wisconsin Power & Light Company, 13. In

(Continued on page 68)

Table I—Bus Operation by Electric Railways and Subsidiary Companies

Ja	. Bus	Ja:	. Bus	Ja	o. Bus
Aiabama	928	Indiana	928	Minnesota	1928
Birmingham Electric Co	8	Chicago, South Bend & Northern Indiana Ry	25	Duluth Street Ry.	14
Selma Electric Ry	5	Railway Transit Lines Chicago, South Shore & South Bend R.R	١	Duluth-Superior Coach Co. Twin City Rapid Transit Co	109
Arizona	4	Gary Railways. Shore Line Motor Coach Co	148	Twin City Motor Bus Co.	107
Tucson Rapid Transit Co	4	Southwestern Mich. Motor Coach Co	}	Mississippi	
Arkansas	10	Evansville & Ohio Valley Ry	2	Mississippi Power Co.	
Arkansas Power & Light Co	7	Indianapolis Street Ry	33	(Gulfport Division)*(Hattiesburg Division)	20
Intercity Terminal Ry	7	Indiana Service Corp	25 43	*(Meridian Division)	7
California		Northern Indiana Power Co	10	Mississippi Power & Light Co (Jackson Division)	1
Bakersfield & Kern Electric Ry Eureka Street Ry	6 1	Terre Haute, Indianapolis & Eastern Trac. Co.	38	*(Vicksburg Division)	3
Key System Transit Co Los Angeles Ry	48 121	Indiana Motor Transit Co. Terre Haute Traction & Light Co	16	Missouri	
Los Angeles Motor Bus Co.		Union Traction Co. of Indiana	40	Hannibal Transportation Co.	11
Market Street Ry	6 19	Iowa		Kansas City, Clay County & St. Joseph Ry Kansas City, Clay County & St. Joseph Auto	13
Pacific Electric Ry	170	Cedar Rapids & Iowa City Ry Des Moines & Central Iowa R.R	7	Transit Co. Kansas City Public Service Co	69
Los Angeles Motor Bus Co. Pacific Gas & Electric Co	6	Dea Moines City Ry	6	Missouri Power & Light Co	2
Peninsular Ry	4	Des Moines Electric Light Co	32	Springfield Traction Co	12
San Diego Electric Ry	20 2	Fort Dodge, Des Moines & Southern Trans- portation Co.		St. Louis Public Service Co	42
Napa Valley Bus Co.		Interstate Power Co	7	*West Misseuri Power Co	2
Sau Francisco—Sacramento R. R	4	Iowa Railway & Light Co	2		
Santa Barbara & Suburban Ry	9 59	(Burlington). (Centerville).	16	Montana Butte Electric Ry	5
Union Traction Co., Santa Cruz	5	(Ottumwa)	6		,
Colorado		Mississippi Valley Electric Co	3 8	Nebraska	, ,
Colorado Springs & Interurban Ry* *Denver & Interurban Motor Co	8 18	Tri-City Ry	12	Lincoln Traction Co Omaha & Council Bluffa Street Ry	14
*Denver & South Platte Transportation Co	2	Kansas		Omaha, Lincoln & Beatrice Ry	3
Denver Tramway	4	Arkansas Valley Interurban Ry	12		U
Grand River Valley Ry	4	Kansas City, Leavenworth & Western Ry	13	New Hampshire	
Connectient		Leavenworth Transportation Co.	9	*Exeter, Hampton & Amesbury Street Ry *Keene Electric Ry	6
Connecticut Co*Danbury Power & Transportation Co	124	Kansas Electric Power Co Kansas Publio Service Co	2	*Laconia Street Ry	11
Groton & Stonington Traction Co	3	*Salina Street Ry	29	*Manchester & Derry Street Ry	3
Hartford & Springfield Coach Co *Lordship Ry	22 6	United Power & Light Corp	13	Nashua Street Ry* *Portamouth Electric Ry	12
*Lordship Ry New Haven & Shore Line Ry	13	Wienita Italifoad & Light Co	17	*Portsmouth Power Co	6
Delaware		Kentucky Traction & Terminal Co	21	New Jersey	
Delaware Electric Power Co	48	Kentucky Traction & Terminal Co	21	New Jersey Central Passenger Ry., Atlantic City	7
	48	Kentucky Traction & Terminal Co	10	Central Passenger Ry., Atlantic City Coast Cities Ry.	7 25
Delaware Electric Power Co Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia	48	Kentucky Traction & Terminal Co		Central Passenger Ry., Atlantic City	7 25
Delaware Electric Power Co	31	Kentucky Traction & Terminal Co	10	Central Passenger Ry., Atlantic City	
Delaware Electric Power Co Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia		Kentucky Traction & Terminal Co	10 23	Central Passenger Ry., Atlantic City	. 9
Delaware Electric Power Co Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co	31	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louislana Elec. Co.	10 23	Central Passenger Ry., Atlantic City Coast Cities Ry Atlantic Coast Transportation Co Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris Couoty Traction Co *New Jersey Inter-Urban Co	. 9
Delaware Electric Power Co Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co Washington & Old Dominion Ry. Washington Ry. & Electric Co Florida *Key West Electric Co	31 1 71	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Rouge Electric Co.	10 23	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co. New Jersey Inter-Urban Co.coach Co. Ocean City Electric R.K	. 9 8
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co Washington & Old Dominion Ry. Washington Ry. & Electric Co Florida *Key West Electric Co Miami Beach Ry Municipal Ry. of St. Petersburg.	31 71 71	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Rouge Electric Co. *Louislana Eleo. Co. New Orleans Public Service, Inc. Maine	10 23 12 3 9 30	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co Cumberland Traction Co Cumberland Transit Co Maurice River Transportation Co Morris County Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Coean City Electric R.H Public Service Ry. Public Service Transportation Co.	. 9 8
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co	31 1 71	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Rouge Electric Co. *Louislana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co.	10 23	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co Maurice River Transportation Co *New Jersey Inter-Urban Co *New Jersey Inter-Urban Coach Co. Coean City Electric R.H Public Service Ry Public Service Transportation Co. Penn-Jersey Transit Co.	9 8 11276
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co	31 71 71	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Rouge Electric Co. *Louislana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland	10 23 12 3 9 30	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co Cumberland Traction Co Cumberland Transit Co Maurice River Transportation Co Morris County Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Coean City Electric R.H Public Service Ry. Public Service Transportation Co.	9 8 11276
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co.	31 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry Cumberland & Westernport Transit Co.	10 23 12 3 9 30	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. *New Jersey Inter-Urban Co *New Jersey Inter-Urban Co Ocean City Electric R.H Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp Central Transportation Co.	9 8 11276
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co	31 71 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louislana Eleo. Co. New Orleans Public Service, Inc. Maine York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomae Edison Co.	10 23 12 3 9 30	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. *New Jersey Inter-Urban Co *New Jersey Inter-Urban Co Coean City Electric R.H Public Service Ry Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp Central Transportation Co. New Mexico	9 8 11276
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co.	31 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry Cumberland & Westernport Transit Co. Potomac Edison Co Blue Ridge Transportation Co. United Rys. & Electric Co	10 23 12 3 9 30	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Coean City Electric R.H Public Service Ry. Public Service Transportation Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque	9 8 1 1276 29
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co	31 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah). Louisville Ry. Kentucky Carriers, Inc. Louisiana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co New Orleans Public Service, Inc Maine York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co Blue Ridge Transportation Co.	10 23 12 3 9 30 8	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. *New Jersey Inter-Urban Co *New Jersey Inter-Urban Co Ocean City Electric R.H Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York	15 . 9 8 1 1276 29
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Coach Co. Savannah Electric & Power Co.	31 71 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louislana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co.	10 23 12 3 9 30 8	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Cean City Electric R.K. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines	9 8 1 1276 29
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electrio & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Caach Co. Savannah Electric & Power Co.	31 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah). Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louislana Elec Co. New Orleans Public Service, Inc. Maine York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co.	10 23 12 3 3 30 8 8	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. *New Jersey Inter-Urban Co *New Jersey Inter-Urban Co Ocean City Electric R.H Public Service Ry. Public Service Transportation Co. Trenton & Mercer County Traction Corp Central Transportation Co. New Mexico City Electric Co., Albuquerque New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry.	15 9 8 1276 29 1 8
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Coach Co. Savannah Electric & Power Co. Idaho *Boise Street Car Co.	31 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Maine York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry.	10 23 12 3 9 30 8 8 9 61 112 3	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Cean City Electric R.H Public Service Ry. Public Service Transportation Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry Brooklyn-Manhattan Transit Corp. Buffalo & Eric Ry	9 8 1 1276 29
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electrio & Power Co. Columbus Electrio & Description Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Caach Co. Savannah Electric & Power Co. Ildahe *Boise Street Car Co.	31 1 71 10 50 8 12	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louislana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Work Street Ry Eastern Massachusetts Street Ry	10 23 12 3 3 9 30 8 8 9 61	Central Passenger Ry., Atlantic City Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. *New Jersey Inter-Urban Co *New Jersey Inter-Urban Coach Co. Ocean City Electric R.H Public Service Ry. Public Service Transportation Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry Brooklyn-Manhattan Transit Corp. Buffalo & Erie Ry Buffalo & Erie Coach Corp.	9 8 1 1276 29 1 8 18 10 3
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Coach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Public Service Co.	31 171 100 508 812 122 432 4	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah). Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston, Worcester & New York Street Ry. Eastern Massachusetts Street Ry. Fitchburg & Leomineter Street Ry. *Gardner—Templeton Street Ry.	10 23 12 3 9 9 30 8 8 9 61 112 3 3 2 41 15	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Cean City Electric R.H. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Buffalo & Erie Ry. Buffalo & Erie Ry. Buffalo & Erie Roach Corp. Cortland County Traction Co. Cortland County Traction Co. Cortland County Traction Co. Cortland County Bus Lines	15 98 1276 29 1 8 188 10 3
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Coach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Public Service Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Electric Ry.	31 171 100 500 8 12 122 4 32 4	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. Etichburg & Leomineter Street Ry. *Gardner—Templeton Street Ry. *Gardner—Templeton Street Ry.	10 23 12 3 3 9 30 8 8 8 9 61 112 3 3 2 41 15 7 7	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris Couoty Traction Co *New Jersey Inter-Urban Co New Jersey Inter-Urban Coach Co. Ocean City Electric R.K. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Buffalo & Erie Ry Buffalo & Erie Coach Corp. Cortland County Traction Co.	9 8 1 1276 29 1 8 18 10 3
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington & Electric Co. Florida *Key West Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Electric & Power Co. Savannah Electric & Power Co. Atlanta Coach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Fox River Electric Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Transportation Co.	31 171 100 500 8 12 12 22 4 32 4	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah). Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. Eastern Massachusetts Street Ry. *Gardner—Templeton Street Ry. *Gardner—Templeton Street Ry. Interstate Street Ry. Middlesex & Baston Street Ry.	10 23 12 3 9 30 8 8 9 61 112 3 241 15 7 7 7	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris Couoty Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Cean City Electric R.H. Public Service Ry. Public Service Transportation Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Buffalo & Erie Ry. Buffalo & Erie Ry. Buffalo & Erie Ry. Cortland County Traction Co. Cortland County Traction Co. Cortland County Bus Lines Eastern New York Utilities Corp. Empire State R.R. Mid-State Coach Lines.	15 98 11276 29 1 8 1810 3 3
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electric Co. Miami Beach Ry Municipal Ry. of St. Peteraburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Coach Co. Savannah Electric & Power Co. Idahe *Boise Street Car Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Public Service Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Transportation Co. Chicago & Joliet Transportation Co. Chicago Surface Lines.	31 171 10 50 8 12 12 22 4 32 4 4 4 75	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah). Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Rouge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. Fitchburg & Leomineter Street Ry. *Gardner—Templeton Street Ry. Holyoke Street Ry. Holyoke Street Ry. Middlesex & Boston Street Ry. Plymouth & Brockton Street Ry. Springfield Street Ry.	10 23 12 3 9 30 8 8 9 61 112 3 241 15 74 74 75 70 36	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris Couoty Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Coean City Electric R.K. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Buffalo & Erie Ry. Buffalo & Erie Coach Corp. Cortland County Traction Co. Cortland County Traction Co. Cortland County Traction Co. Cortland County Bus Lines Eastern New York Utilities Corp.	15 98 11276 29 1 8 1810 3 3
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Coach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Publio Service Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Electric Ry. Chicago & Joliet Transportation Co. Chicago, North Shore & Milwaukee R.R. Chicago & West Towns Ry.	31 171 100 500 88 12 1222 4 324 4	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah). Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Rouge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. Fitchburg & Leomineter Street Ry. *Gardner—Templeton Street Ry. Holyoke Street Ry. Holyoke Street Ry. Middlesex & Boston Street Ry. Plymouth & Brockton Street Ry. Springfield Street Ry.	10 23 12 3 9 30 8 8 8 9 61 112 3 3 241 15 74 70 3	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris Couoty Traction Co *New Jersey Inter-Urban Co. New Jersey Inter-Urban Co. Ocean City Electric R.H Public Service Ry. Public Service Transportation Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry Brooklyn-Manhattan Transit Corp. Buffalo & Eric Ry. Buffalo & Eric Ry. Buffalo & Eric Coach Corp. Cortland County Traction Co. Cortland County Traction Co. Cortland County Traction Co. Cortland County Traction Co. Cortland County Bus Lines Eastern New York Utilities Corp. Empire State R.R. Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R Sacandaga Valley Transportation Corp. Geneva. Seneca Falls & Aburn R.R.	15 9 8 8 1 1 1276 29 1 8 8 18 10 3 3 3 6 6 1 3
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electrio & Power Co. Columbus Electrio & Power Co. Georgia Power Co. Atlanta Caach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Publio Service Co. Chicago, Aurora & Elgia R.R. Chicago & Joliet Electric Ry. Chicago & Joliet Transportation Co. Chicago, North Sbore & Milwaukee R.R. Chicago & West Towns Ry. East St. Louis & Suburban Ry.	31 171 10 50 8 12 12 22 4 32 4 4 4 75	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. *Gardner—Templeton Street Ry. *Gardner—Templeton Street Ry. *Gardner—Templeton Street Ry. Middlesex & Baston Street Ry. Plymouth & Brockton Street Ry. Springfield Street Ry. Springfield Street Ry. Worcester Consolidated Street Ry.	10 23 12 3 9 30 8 8 8 8 9 61 112 3 3 7 7 7 3 8 7 7 7 3 8	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Cean City Electric R.H Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry Brooklyn-Manhattan Transit Corp. Buffalo & Erie Ry. Buffalo & Erie Ry. Buffalo & Erie Coach Corp. Cortland County Traction Co. Cortland County Traction Co. Cortland County Bus Lines Eastern New York Utilities Corp. Empira State R.R Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R Sacandago Valley Transportation Corp. Geneva, Seneca Falls & Auburn R.R. Hamburg Railway. Huntington Traction Co.	15 9 8 11276 29 1 8 18 10 3 3 6 1
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Transportation Co. *Fairburn & Atlanta Ry. & Electric Co. Georgia Power Co. Atlanta Coach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Public Service Co. Chicago, Aurora & Elgin R. Chicago & Joliet Transportation Co. Chicago, North Shore & Milwaukee R.R. Chicago Surface Lines. Chicago & West Towns Ry. East St. Louis Ry. Co. Blue Goose Motor Coach Co. Red Line Motor Bus Co.	31 171 100 500 88 12 1 222 4 32 4 4 5 9 9 9	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Elec Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. Eastern Massachusetts Street Ry. Fitchburg & Leomineter Street Ry. **Gardner—Templeton Street Ry. Holyoke Street Ry. Holyoke Street Ry. Middlesex & Boston Street Ry. Plymouth & Brockton Street Ry. Springfield Street Ry. Windlesan City of Detroit, Department of Street Rys.	10 23 12 3 9 30 8 8 8 9 61 112 3 3 7 7 7 3 8 7 7 7 3 8 7 7 7 7 7 7 7 7	Central Passenger Ry., Atlantic City. Coast Cities Ry. Allantic Coast Transportation Co. Cumberland Traction Co. Cumberland Transit Co. Maurice River Transportation Co. *New Jersey Inter-Urban Co. *New Jersey Inter-Urban Co. Ocean City Electric R.H. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R. Mid-State Coach Lines Binghamton Ry. Bufalo & Erie Ry. Bufalo & Erie Ry. Bufalo & Erie Coach Corp. Cortland County Traction Co. Cordand County Traction Co. Cordand County Bus Lines Eastern New York Utilities Corp. Empira State R.R. Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R. Sacandaga Valley Transportation Corp. Geneva, Seneca Falls & Auburn R.R. Hamburg Railway. Huntington Traction Co. International Ry.	15 9 8 8 1 1 1276 29 1 8 8 18 10 3 3 3 6 6 1 3
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electrio & Power Co. Columbus Electrio & Power Co. Atlanta Caach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Publio Service Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Electric Ry. Chicago & Joliet Transportation Co. Chicago, North Shore & Milwaukee R.R. Chicago & West Towns Ry. East St. Louis & Suburban Ry. East St. Louis Ry. Co. Blue Goose Motor Coach Co. Red Line Motor Bus Co. Evanston Ry.	31 171 100 500 88 12 1 222 4 32 4 4 5 9 9 9	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. Eastern Massachusetts Street Ry. *Gardner—Templeton Street Ry. *Gardner—Templeton Street Ry. Holyoke Street Ry. Interstate Street Ry. Michlegan City of Detroit, Department of Street Rys. Michlegan City of Detroit, Department of Street Rys.	10 23 12 3 9 30 8 8 8 9 61 112 3 3 7 7 7 3 8 7 7 7 3 8 7 7 7 7 7 7 7 7	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co, Morris Cenoty Traction Co *New Jersey Inter-Urban Co New Jersey Interurban Coach Co. Ocean City Electric R.K. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Buffalo & Eric Ry Buffalo & Eric Ry Buffalo & Eric Coach Corp. Cortland County Traction Co. Cordand County Bus Lines Eastern New York Utilities Corp. Empira State R.R. Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R Sacandaga Valley Transportation Corp. Geneva, Seneca Falls & Auburn R.R. Hamburg Railway. Huntington Traction Co. International Ry. International Bys. Corp.	15 9 8 8 1 1276 29 1 8 8 18 10 3 3 3 6 1 1
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electric & Power Co. Columbus Electric & Power Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Public Service Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Electric Ry. Chicago & Joliet Transportation Co. Chicago, North Shore & Milwaukee R.R. Chicago & Joliet Trowns Ry. East St. Louis & Suburban Ry. East St. Louis Ry. Co. Blue Goose Motor Coach Co. Red Line Motor Bus Co. Evanston Ry. Evanston Ry. Evanston Ry. Evanston Bus Co.	31 171 100 50 8 12 12 22 4 32 4 4 5 9 9 2 9 2 9	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Eastern Massachusetts Street Ry. Fitchburg & Leomineter Street Ry. Fitchburg & Leomineter Street Ry. Holyoke Street Ry. Holyoke Street Ry. Holyoke Street Ry. Middlesex & Boston Street Ry. Plymouth & Brockton Street Ry. Springfield Street Ry. Union Street Ry. Union Street Ry. Union Street Ry. Union Street Ry. Michigan City of Detroit, Department of Street Rys. Detroit United Ry. Peoples Motor Coach Co. Grand Rapids, Grand Haven & Muskegon Ry.	10 23 12 3 9 30 8 8 9 61 112 3 241 15 7 7 7 3 8 8 13 47	Central Passenger Ry., Atlantic City. Coast Cities Ry. Allantic Coast Transportation Co. Cumberland Traction Co. Cumberland Transit Co. Maurice River Transportation Co. Morris Couoty Traction Co. *New Jersey Inter-Urban Co. New Jersey Inter-Urban Coach Co. Ocean City Electric R.H. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R. Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Buffalo & Eric Ry. Buffalo & Eric Ry. Cortland County Traction Co. Carland County Traction Co. Carland County Traction Co. Cortland County Traction Co. Empire State R.R. Mid-State Coach Lines Eastern New York Utilities Corp. Empire State R.R. Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R. Sacondaga Valley Transportation Corp. Geneva, Seneca Falls & Auburn R.R. Hamburg Railway. Huntington Traction Co. International Ry. Jamestown Motor Bus Transportation Co.	15 9 8 8 1 1276 29 1 8 18 10 3 3 3 6 1 1 3 2 4 86 18
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electrio & Power Co. Columbus Electrio & Power Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Gentral Illinois Publio Service Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Electric Ry. Chicago & Joliet Electric Ry. Chicago & West Towns Ry. East St. Louis & Suburban Ry. East St. Louis Ry. Co. Red Line Motor Bus Co. Evanston Ry. Evanston Bus Co. Illinois Power Co. Clilinois Power Co. Elilinois Power Co. Ellinois Power Co. Illinois Power Co. Ellinois Power Co. Illinois Power Co.	31 171 10 50 8 12 22 4 32 4 4 5 9 9 2 9 47 5 28 43 15 16 16 16 16 16 16 16 16 16 16 16 16 16	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. *Alexandria Municipal Railway. Baton Rouge Electric Co. *Louisiana Eleo. Co New Orleans Public Service, Inc Maine York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston. Worcester & New York Street Ry. Eastern Massachusetts Street Ry. Fitchburg & Leominster Street Ry. *Gardner—Templeton Street Ry. Holyoke Street Ry. Interstate Street Ry. Nindlesex & Boston Street Ry. Plymouth & Brockton Street Ry. Plymouth & Brockton Street Ry. Springfield Street Ry. Worcester Consolidated Street Ry. Michigan City of Detroit, Department of Street Rys. Peoples Motor Coach Co. Grand Rapids, Grand Haven & Muskegon Ry.	10 23 3 3 9 30 8 8 8 9 61 112 241 157 73 3 8 70 3 3 47	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co *New Jersey Interurban Coach Co. Ocean City Electric R.K. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Cortland County Traction Co. Cortland County Bus Lines Eastern New York Utilities Corp. Empira State R.R Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R Sacandago Valley Transportation Corp. Geneva, Seneca Falls & Auburn R.R. Hamburg Railway. Junternational Bys Corp. Jamestown Street Ry. Jamestown Corp. City Transportation Corp. Cingston Consolidated R.R Kingston Consolidated R.R	15 9 8 8 1 1276 29 1 8 8 18 10 3 3 3 3 6 6 1 1 8 8 6 18 5
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electrio & Power Co. Columbus Electrio & Power Co. Georgia Power Co. Atlanta Caach Co. Savannah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Publio Service Co. Chicago, Aurora & Elgia R.R. Chicago & Joiet Electric Ry. Chicago & Joiet Electric Ry. Chicago & West Towns Ry. East St. Louis & Suburban Ry. East St. Louis Ry. Co. Blue Goose Motor Coach Co. Red Line Motor Bus Co. Evanston Ry. Evanston Ry. Evanston Bus Co. Illinois Power & Light Corp. Illinois Traction System. **Joliet, Plainfield & Aurora Transportation Co.	31 171 10 50 8 12 12 22 4 4 32 4 4 4 5 9 2 9 2 9 15 10 10 10 10 10 10 10 10 10 10 10 10 10	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Rouge Electric Co. *Louisiana Eleo. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Blue Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Boston, Worcester & New York Street Ry. Eastern Massachusetts Street Ry. *Gardner—Templeton Street Ry. *Gardner—Templeton Street Ry. Michigan City of Detroit, Department of Street Ry. Peoples Motor Coach Co. Grand Rapids, Crand Haven & Muskegon Ry. Grand Rapids Ry. Michigan Electric Ry. Michigan Electric Ry.	10 23 12 3 3 9 30 8 8 8 9 61 112 3 3 241 15 7 7 7 7 3 3 6 13 4 7 7 10 12 18 18 18 18 18 18 18 18 18 18 18 18 18	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris Couoty Traction Co *New Jersey Inter-Urban Co. *New Jersey Inter-Urban Co. New Jersey Interurban Coach Co. Coean City Electric R.H Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Buffalo & Erie Ry. Buffalo & Erie Ry. Buffalo & Erie Coach Corp. Cortland County Traction Co. Carlland County Bus Lines Eastern New York Utilities Corp. Empira State R.R. Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R Sacandaga Valley Transportation Corp. Geneva, Seneca Falls & Auburn R.R. Hamburg Railway. Huntington Traction Co. International Ry. International Bus Corp. Jamestown Street Ry. Jamestown Motor Bus Transportation Co. Kiogston Consolidated R.R. Kingston City Transportation Corp.	15 9 8 8 1 1276 29 1 8 18 10 3 3 3 6 1 1 3 2 4 86 18
Delaware Electric Power Co. Delaware Bus Co. Southern Pennsylvania Bus Co. District of Columbia Capital Traction Co. Washington & Old Dominion Ry. Washington Ry. & Electric Co. Florida *Key West Electrio Co. Miami Beach Ry. Municipal Ry. of St. Petersburg. Tampa Electric Co. Georgia Augusta—Aiken Ry. & Electric Co. Columbus Electrio & Power Co. Columbus Electrio & Power Co. Savanuah Electric & Power Co. Illinois Aurora, Elgin & Fox River Electric Co. Central Illinois Public Service Co. Chicago, Aurora & Elgin R.R. Chicago & Joliet Electric Ry. Chicago & Joliet Electric Ry. Chicago & West Towns Ry. East St. Louis & Suburban Ry. East St. Louis Ry. Co. Blue Goose Motor Coach Co. Red Line Motor Bus Co. Evanston Bus Co. Illinois Power Co. Illinois Power Co. Elinois Power Co. Elinois Power Co. Illinois Power	31 171 100 50 8 12 1 22 4 32 4 4 5 9 9 2 9 9 47 5 2 8 104 104 105 105 105 105 105 105 105 105 105 105	Kentucky Traction & Terminal Co. Kentucky Coach Co. Kentucky Utilities Co. (Paducah) Louisville Ry. Kentucky Carriers, Inc. Louisville Ry. Kentucky Carriers, Inc. Louislana *Alexandria Municipal Railway. Baton Ronge Electric Co. *Louisiana Elec. Co. New Orleans Public Service, Inc. Malne York Utilities Co. Maryland Cumberland & Westernport Electric Ry. Cumberland & Westernport Transit Co. Potomac Edison Co. Buke Ridge Transportation Co. United Rys. & Electric Co. Baltimore Coach Co. East Fayette Street Bus Co. Washington, Baltimore & Annapolis Elec. R.R Massachusetts Boston Elevated Ry. Eastern Massachusetts Street Ry. Fitchburg & Leomineter Street Ry. Fitchburg & Leomineter Street Ry. Holyoke Street Ry. Holyoke Street Ry. Holyoke Street Ry. Hymouth & Brockton Street Ry. Plymouth & Brockton Street Ry. Plymouth & Brockton Street Ry. Michigan City of Detroit, Department of Street Rys. Peoples Motor Coach Co. Grand Rapids, Grand Haven & Muskegon Ry. Grand Rapids, Grand Haven & Muskegon Ry. Grand Rapids, Grand Haven & Muskegon Ry. Michigan Electric Ry.	10 23 12 3 9 30 8 8 8 9 61 112 3 3 74 75 77 3 3 6 13 47 7 3 10 2 18 18 18 18 18 18 18 18 18 18 18 18 18	Central Passenger Ry., Atlantic City. Coast Cities Ry Allantic Coast Transportation Co. Cumberland Traction Co Cumberland Transit Co. Maurice River Transportation Co. Morris County Traction Co *New Jersey Inter-Urban Co *New Jersey Interurban Coach Co. Ocean City Electric R.K. Public Service Ry. Public Service Transportation Co. Penn-Jersey Transit Co. Trenton & Mercer County Traction Corp. Central Transportation Co. New Mexico City Electric Co., Albuquerque. New York Auburn & Syracuse Electric R.R Mid-State Coach Lines Binghamton Ry. Brooklyn-Manhattan Transit Corp. Cortland County Traction Co. Cortland County Bus Lines Eastern New York Utilities Corp. Empira State R.R Mid-State Coach Lines. Fonda, Johnstown & Gloversville R.R Sacandago Valley Transportation Corp. Geneva, Seneca Falls & Auburn R.R. Hamburg Railway. Junternational Bys Corp. Jamestown Street Ry. Jamestown Corp. City Transportation Corp. Cingston Consolidated R.R Kingston Consolidated R.R	15 9 8 8 1 1276 29 1 1 8 18 10 3 3 3 6 1 1 3 2 4 6 6 18 5 27

Table I-Bus Operation by Electric Railways and Subsidiary Companies-(Concluded)

No. Ja	Bus		o. Bus an. I,		o. Bu«
	928		1928		an. 1, 1928
Darling Bus Line East Avenue Bus Co. Rochester Interurban Bus Co.		Altoona & Logan Valley Electric Ry		Abilene Traction Co Austin Street Ry. Dallas Ry. & Terminal Co	. 3
Rochester Railways Co-ordinated Bus Lines New York State Rys. (Syracuse) Syracuse Rrailway Co-ordinated Bus Line	17	Bangor & Nazareth Transit Co Bangor & Portland Transit Co Paul R. La Bar	. 2	Eastern Texas Electric Co. El Paso Electric Co. Galveston Electric Co.	. 9
New York State Rya. (Utica)	9	Beaver Valley Traction Co		Houston Electric Co	44
Niagara Gorge R.R	4	*Berwick & Nescopeck Street Ry Chambersburg & Shippensburg Ry Cumberland Valley Transit Co.	. 2	Northern Texas Traction Co	. 3
Olean, Bradford & Salamanca Ry	6	Citizens Traction Co	. 13	*Nucces Ry. *Rio Grande Valley Traction Co San Antonio Public Service Co	. 5
*Peekskill Lighting & R.R. Co	29	Conestoga Traction Co	. 4	*Southwestern Transit Co. Texas Electric Ry. Wichita Falls Traction Co.	. 4
Rochester & Syracuse R.R	2 1	*Duqueane & Dravoaburg Street Ry East Penn Electric Co	. 5	Utah	
Mid-State Coach Lines Syracuse & Eastern R.R Syracuse & Eastern Bus Lines	3	Erie Ry Erie Coach Co. Johnstown & Somerset Ry		Bamberger Electric R.R Utah-Idaho Ceatral R.R Utah Light & Traction Co	
Third Avenue Ry	41	Johnstown Traction Co	. 12	Vermont	. 9
North Street Transportation Corp. Westchester Street Transportation Co. United Traction Co	80	Lackawanna & Wyoming Valley R.R Laurel Line Bus Co.		Burlington Traction Co *Twin State Gas & Electric Co	3 4
Capital District Transportation Co.	8	Lehigh Traction Co		Virginia Lynchburg Traction & Light Co	2
*Walkill Transit Co	16	Lehigh Valley Transit Co		Roanoke Railway & Floetric Co	. 3
North Carolina Carolina Power & Light Co	19	Lewiston & Reedsville Electric Ry Lewiston & Reedsville Transportation Co. *North Branch Bus Co		Virginia Electric & Power Co. Virginia Public Service Co. Citizens Rapid Transit Co.	216
Durham Public Service Co North Carolina Public Service Co Greensboro Bus Co.	17	Northumberland County Ry Sunbury Transit Co.	. 3	Washington	
Southern Public Utilities Co	20 3	Northwestern Electric Service Co Penn Public Motor Transportation Co.		Grays Harbor Ry. & Light Co Twin City Transit Co. Lewiston-Clarkston Transit Co	
Coast City Tronsit Co.		Philadelphia Rapid Transit Co	569	Puget Sound International Ry & Pura Co	20
Northern States Power Co	3	Philadelphia & Westchester Traction Co Aronimink Transportation Co.	24	Pinget Sound Power & Light Co. Seattle Municipal St. Ry Seattle & Rainier Valley Ry	120
Ohio		Pittsburgh, Mars & Butler Ry Pittsburgh, Harmony, Butler & New Castle Ry	(0	Tacoma Municipal Belt Line Yakima Valley Transportation Co	- 1
Cincinnati, Lawrenceburg & Aurora Electric Street Ry.	7	Harmony Short Line Motor Transportation C Pittsburgh Rys Pittsburgh Motor Coach Co.		West Virginia Charleston Interurban R.R	40
Cincipnati Street Ry. City of Ashtabula—Division of Street Rys. Cleveland Ry.	68 3 161	Reading Transit CoSchuylkill Ry.	6	Monongahela Transport Co.	41
Southwestern Bus Co	14	Scranton Montrose & Binghamton R.R. Scranton Ry Scranton Bus Co.	2	Ohio Valley Electric Ry Ohio Valley Bus Co.	
Columbus, Delaware & Marion Elec. Co Columbus Railway, Power & Light Co *Columbus, Urbana & Western Electric Ry	4 3 2	Shamokin & Edgewood Electric Ry	6	Wheeling Public Service Co Wheeling Traction Co Ohio Valley Transit Co.	12
Community Traction Cn Dayton Dayton Street Ry Dayton, Springfield & Xenia Southern Ry	36	Shamokin & Mt. Carmel Transit Co	3	Wisconsin	
Dayton & Columbus Transportation Co	34	Southern Cambria Ry	4	Madison Rys. Milwaukee Electric Ry. & Light Co. Wisconsin Motor Bus Lines	
Lake Shore Electric Ry Maumee Valley Co Maumee Valley Transportation Co.	7 13	Stroudsburg Traction Co East Stroudsburg Bus Co.		Wisconsin Gas & Electric Co Wisconsin Michigan Power Co Intercity Bus Co.	1 0 16
Nelsonville-Athena Electric Ry	1	*United Traction Street Ry	- 1	Wisconsin Power & Light Co	52
Northern Ohio Power & Light Co Ohin Public Service Co	217	West Chester Street Ry Peoples Transportation Corp. Westmoreland County Ry	1	Wisconsin Public Service Corp	• •
Ohio Service Co Penn Ohio Elec. Co Youngstown Municipal Ry.	116	Chestnut Ridge Transportation Co. West Penn Rys.		Wisconsin Valley Electric Co	4
West End Traction Co. Akron Youngstown Co. Penn Ohio Coach Lines		Penn Bus Lines Westside Electric Street Ry		Wyoming *Cheyenne Motor Bua Co	5
Cleveland Mahoning Valley Coach Lines New Castle Elec. St. Ry. H. A. K. Bus Co.		Westside Motor Transit Co. Wilkes-Barre Ry.	28	Canada British Columbia Electric Ry	22
Penn Ohio Tourist Co. Portsmouth Public Service Co.	9	Williamsport Railways. Williamsport Transportation Co. York Rys.		British Columbia Transit Co. Dominion Power & Transmission Co.	23
Southern Ohio Public Service Co	33	York Transit Co.	7	Grand River Ry Canadian Pacific Transport Co., Ltd. Hydro-Electric Rys	18
Steubenville, East Liverpool & Beaver Valley Traction Co. Toledo & Indiana R.R.	1	Rhode Island *Newport Electric Corp	21	Levis Tramways. London Street Ry. Montreal Tramways.	1
Yaungstown & Ohio River R.R Youngstown & Suburban Ry	1 4 14	*Newport & Providence Ry United Electric Rys	22 60	New Brunswick Power Co. Ottawa Electric Ry. Pictou County Electric Co.	- 1
Oklahoma		South Carolina South Carolina Gas & Electric Co	8	Quebec Railway, Light & Power Co Toronto Transportation Commission	- 11
Northeast Oklahoma R.R. Oklahoma Ry. Oklahoma Union Ry	5 26	Sparta snburg Bus Co,	ŏ	Gray Coach Lines, Ltd. Winnipeg Electric Ry *Woodstock, Thames Valley & Ingersoll Elec-	
Oklahoma Union Ry. Union Transportation Co. *Okmulgee Traction Co	80	South Dakota Siour Falla Traction System	18	trie Ry	3
*Shawnee-Tecumseh Traction Co Tulsa Street Ry	7 5	Tennessee		Hawaii Honolulu Rapid Transit Co	6
Oregon		Nashville Interurban Ry	9	Panama Panama Electric Co	2
Oregon Electric Ry Portland Electric Power Co *Southern Pacific System (Salem)	6 39 3	Nashville Railway & Light Co Tenneasee Electric Power Co Union Traction Co	13	Porto Rico	
- Control Cyaletti (Saletti)) [Chaon Traction Co	11	Ponce Electric Co	4

Table II—Buses Bought by Railways During 1927

Total Type 4 2*	Type Chassis Graham Reo	Body	eating Ca- pacity 21 15	Fort Dodge, Des Moines & Southern R.R Iowa Southern Utilities	Total 5	Total Type 2 3	Type Chassis Yellow A.C.F.	Body Builder Yellow A.C.F.	Seating Ca- pacity 29 29
I 8	Reo		21 15	& Southern R.R Iowa Southern Utilities	5	3	A.C.F.	A.C.F.	29 29
8	Twin Coach								
8	Twin Coach			Co Tri-City Ry	8 5	8 5	Mack Mack	Mack Mack	25 29
	Yellow Fageol-Cal, Yellow	Twin Coach Yellow Fageol Yellow	40 29 29 21	Kansas Arkansas Valley Inter-					
i	Twin Coach Fageol-Cal.	Twin Coach Fageol	45 58	urban Ry Kansas City, Leaven-	2	2	Studebaker	Studebaker	18
4	Yellow Single Motor	Yellow	63	worth & Western Ry. Kansas Electric Power		6	Mack	Mack	25
3	Co.	Fageol California Motor	29	Co	6	1	Yellow G.M.C. Yellow	Yellow Lang Vellow	21 21 21
,	Mack	Coach	25			•	2 (110	· calo	
1 8	Yellow	Fageol Yellow	29	Kentucky Traction &			** **		
	Fageol-Cal.	Fageol	31	Kentucky Utilities Co.	I 4	•			21
				Louisville Ry	6	6	Reo	Reo	21 21
2	Mack	Mack	25—35	Louisiana					
16	Yellow	Yellow	29 29	Louisiana Electric Co.,	9	9	Yellow	Yellow	21
1	Graham	Graham	21	Service, Inc	11	2	A.C.F. Yellow	St. Louis Car. Co. Yellow	28 28
Ĩ 3*	A.C.F.	A.C.F.	21 23	Maryland					
1* 3*	Reo Moreland	Reo Moreland	12 16	Cumberland & Western-					
8*	White	White	20	_		1	Mack White	Mack Leonhardit	29 14
2	37 11	37 B	21	Potomac Ediaon Co	18	4	International	Lang	21 28 18
				United Rys. & Elec. Co.	37	10	Mack	Mack	24 29
2	International	Lang	29			20	Brockway Mack	Brockway Wolfington	16 29
2	Graham	Graham	21	Washington, Baltimore		1	Nash	Nash	7
		26.1	20	R.R	3	3	Yellow	Yellow	29
12	Yellow	Yellow	29	Massachusetts					
2.0				Boston Elevated Ry	12	7 2	White Mack	Brown Mack	29 29
•	***********		• •			1†	Mack Fageol-A.C.F.	Mack Fageol-A.C.I'.	29 29
1	A.C.F.	A.C.F.	23	Eastern Massachusetts	11				35 29
6 2	Yellow	Yellow	29	outeet ny	''	Ī	A.C.F.	A.C.F.	29 29
i	Twin Coach	Twin Coach	37			4	White	Brown	29 29
10	Yellow Yellow	Yellow Yellow	29 21	Gardner-Templeton Street Ry	3	1	Pierce Arrow Wachusett	Paterson Wachusett	24 25
		26.1	20		- 1	1+		Bender Mack	29 25
1*	Mack	Mack	29	Street Ry	18	18	White Mack	Beader Mack	29 29
				Union Street Ry	1	3	Yellow White	Yellow Wason	29 29
4 5	Studebaker Twio Coach	Studebaker Twio Coach	21 40	Worcester Consolidated Street Ry	30	7	Yellow	Lang	29
6	Mack	Mack				5	Fageol-A.C.F.		29 29 29
2	Pierce Arrow Mack	Buffalo Mack	29 29	WI - 1.7-		•	2011011	- HE MARGINE ASCINUM	-/
3* 3	Reo Yellow	Reo Yellow	21 21	City of Detroit-Dept.					
5 1	Mack ' Mack	Mack Mack	29 25	of Street Rya Detroit United Ry	1 2	1 5	Graham A.C.F.	Graham A.C.F.	12 27
10 14	Dodge Ve low	Graham Vellow	21	Count Postdo Count		1*	White White	Bender Bender	28 18
4	Studebaker A.C.F.	Studebaker A.C.F.	21 27	Haven & Muskegon	6	6	A.C.F.	A.C.F.	27
_			-,	Lighting Co	1	1	Reo	Reo	21
				Minnesota					
10	A.C.F.	A.C.F.	28	Duluth Street Ry Twin City Rapid Transit	4	4	Yellow	Yellow	21
22 22	A.C.F. Yellow	A.C.F. Yellow	26 29	Co	18	8 5	Mack Mack	Eckland	29 25 29 29
3 1 1*	White Yellow Twin Coach	Bender Yellow Twin Coach	25 21 37			2† 2		Eckland Eckland Twin Coach	29 29 40
		Mack	25			-	2 WIII CORUII	Couch	10
2	Mack	MACK		Miceleclani					
2	MACK	MACA		Mississippi Mississippi Power & Light Co. (Vicksburg					
	18 1 1 1 2 2 1 16 7 1 2 ! ** * * * * * * * * * * * * * * * *	Fageol-Cal. Yellow A.C.F. Fageol-Cal. Twin Coach Yellow Mack Yellow Mack Mack	Fagcol-Cal	Fageol-Cal. Fageol 29	Fageol-Cal. Fageol 29	Fageol Cal	Fageol Cal. Fageol 29	Topeka Ry.	Topeka Ry. 6 6 Yellow Yellow 2

^{*} Second hand. † Gas-electric

Table II—Buses Bought by Railways During 1927—(Continued)

Same of Company Total Type Body South Province Provi					8 /		7		' '	Jonanac	• /	
Students Missouri		Tota Typ	d Type e Chassia	Body			Total			Body		
Students & St. Joseph Ry	2	2			24	Beaver Valley Traction	-		0 11			
White Section Sectio	St. Louis Electric Termi-						Citizens Traction Co	2	2	Yellow		
Secretary Secretary Students Student	St. Louis Public Service						East Penn Electric Co	5				
Patter Figure F	00	2	4	wnite		21	Erie Rys	2	*	White		16
Rate Electric By. 2 2 Fageol-A.C.F. Fageol 29 Leghely Valley Trainity 3 Mack 30 Mack 20	Montana						Johnstown Traction Co.	2	- 1	Ye.low	Yellow	21
Leceila Sirver My	Butte Electric Ry	2	2	Fageol-A.C.F.	Fageol	29	Lehigh Valley Transit		-			
New Jersey)	2			
Second Studenbare Second				-	*		Electric Rv	4	4	White		29
New Jersey	Laconia Street Ry	6	1			21	North Branch Bus Co Northwestern Flectric	1	1			
Contail Passenger Ry			1	Studebaker	Studebaker	20	Service Co	4	4			21
Center Case Now Tongot						Transit Co	205				29	
Chester Tracision Co. 5 5 White Bender 19		7	6	Vallow	Vallow	21	Philadelphia & W.					
Public Service Ry			- 1	Yellow	Yellow	29	Chester Traction Co		5		Bender	21
1			65†	A.C.F.	P.S.	31	Fittsburgh Rys	23	20 1	White		
White Bender 29 White Bender 20 White Bender 20 White Bender 20 White Bender 20			38	A.C.F.	A.C.F.	29			1			29
White Bender 29 White Bender 20 White Bender 20 White Bender 20 White Bender 20						29 29	Reading Transit Co	6		White	Bender	29
Separation March 1 Yellow Yellow 29						29 22	Schuvlkill Transporter		Ī			21
Segration Montroes & Binghanton Ry A Mack Mack Mack ACF Shamokin & Edgewood ACF ACF ACF Shamokin & Edgewood ACF		20	Yellow		29		3				33	
Seration Ry			-	212015			Scranton, Montrose &	2	1	renow	1 ellow	29
Start	New Yurk						Scranton Rv		4	A.C.F.	A.C.F.	29
Burdla & Frie Rv. 3 5 Mack Special 29 Trainst Co. 4 1 Mack Special 29 Ramburg Rp. 2 1 Mack Mack Mack 29 Ma	Binghamton Ry	6				25	Elec. Ry	1	1	Mack	Mack	25
Huntington Trac. Co.	Buffalo & Frie Rv		3	Mack	Mack	21	Shamokin & Mt. Carmel	3	1	Yellow	Yellow	21
International Records		_	1	Mack	Lang	25			1	Assembile	Hahn	17
International Ry. 33 23 Yellow Yellow 23 Yellow 24 Yellow 25 Yellow Yellow 25 Yellow 25 Yellow 25 Yellow 25 Yellow 25 Yellow Yellow	Huntington Trac. Co	4	1*	Mack	Mack	29	Westmoreland County	1				
Name	International Ry	33				33	West Penn Rys	, i	1	International	Lang	
New York & Stamford Ry. Section Sectio	Jamestown Street Rv.	11				27 21		•	•	1 ellow	1 ellow	29
Second S	Newburgh Public Service		1					4	4	Maak	Maak	25
North Dakota Nort			5*					,	•	Mack	Mack	23
Orlean Brackford & Sale 1	Ry											
March 1		0	3			25		4	1			17
Dinited Traction Co 27 28 14 A.C.F. A.C.F. 23 A.C.F. A.C.F. 24 A.C.F. A.C.F. 25 A.C.F. 25 A.C.F. 25 A.C.F. 27 A.C.F. 27 A.C.F. 28 A.C.F. 29 A.C	manca Ry	1	1	A.C.F.	Baker Ranlang	18			1	Studebaker	Superior	15
United Traction Co	pingers Falla Ry								- 1	Studebaker	Superior	19
Mack Almi Versare Versare Almi Co	Third Avenue Railway	21			Mack	29	Texas					
Mack Almi Versare Versare Almi Co	United Traction Co	27			Mack Mack	25 29	Abilene Traction Co	J	1	Reo	Fitsjoha	21
North Dakota			3†	Mack	Mack .	41		4	1			
Northern States Power Co. 1 Reo Fitsjohn 21 Northern Texas Traction			.,	· cesaro	, de see o		El Paso Electric Co	2	- 1	Yellow	Yellow	21
Cleveland Railway	North Daketa						Houston E.ectric Co	7				21 33
Northern Texas Traction Co. Northern Texas Traction Co. San Antonio Public San An	Northern States Power Co.	1	1	Reo	Fitsjohn	21			1	A.C.F.	Mack A.C.F.	33 29
Cliceinanti Street Railway 1 1 1 Mack Mack 29 Clievelend Railway 50 10 White Lang 29 White Lang 29 White Lang 29 Service Co	011-						Northern Texas Traction		2	Twin Coach	Twin Coach	40
Clevelend Railway		,	1	Maale	Mode	20		5				21
Six Wheel Hoover 61 Versare Versare 39 Utah Utah Light & Traction Co	Cleveland Railway	50		White	Lang	22		2				
1 Versare Versare 39 Utah Utah Light & Traction Co			10	Yellow	Yellow	29	Southwestern Transit Co.					18
Cleveland Sonthwestero Ry. & Light Co.						39	Utah					
Ry, & Light Co	Cleveland Southwestero			Versare		37	Utah Light & Traction			Nr. 1		25
Columbus, Delaware & Marion Electric Co		11	4 7*			29 29	Co.,,,,,,,,,,,,,,,	6	1	Mack	Mack	29
Community Traction Co. 1 Buick Buick Studebaker Studebaker	Columbus, Delaware & Marion Electric Co	4							1 3*			21
Northern Ohio Power & Light Co.		6	1	Buick	Buick		Varmont					
Northern Ohio Power & Light Co.	Indiana, Columbus &	2						2	1	Studebaker	Studebaker	21
Light Co.		,	î						i			
Virginia	16			Lang				- 1	White	Brown	21	
Yellow Yellow 30 Roanoke Ry. E.ectro				N.O.P. & L.			Virginia					
Pennsylvania-Ohio Electric Co 18 Stroughton Stroughton Stroughton Stroughton Stroughton 18 Dodge-Graham 19 Dodge-Graham 29 Dodge-Graham 21 Dodge-Graham 21 Standam Stroughton S			1	Yellow	Lang Yellow	30				C=-1	Contract	21
Pennaylvania-Ohio Electric Co				Garford	Garford	19	Virginia Electric & Power		1			
Washington Washington Washington Washington Puget Sound Pwr. & Lt. 28 28 28 28 Seattle Municipal Street Ry. 2 Studebaker 21	Pennsylvania-Ohio Elec-						Co	25	5	White	Bender	21
Oklahoma Ry 6 4 Yellow 21 Co	tric Co	6	6	White	Bender	29			10			
Oklahoma Ry 6 4 Yellow Yellow 21 Co	Oldsham						Washington					
Oklahoma Union Ry 8 8 Mack Lang 21 Seattle Municipal Street Ry		6	A	Vallow	Vallow	21		28	72			
Shawnee-Tecumseh Tacoma Municipal Belt			2	Grabam	Graham	21	Seattle Municipal Street					21
Traction Co / / renow renow 21 Line 1 White 24	Shawnee-Tecumsch						Tacoma Municipal Belt					
	raction Co	/		1 ellow	I ellow	21	Lane	-1		w nite	* * * * * *	24

^{*} Second hand. † Gas-electric.

Table II—Buses Bought by Railways During 1927—(Concluded)

Name of Company West Virginia	Fotal	Total Type		Body	Seating Ca- pacity	Name of Company Canada	Total	Total Type		Body Builder	Seating Ca- pacity
Charleston Interurban R.R. Co		7	Yellow	Yellow	17	Dominion Power & Transmission Co	13	6	Yellow	National Steel Ca	
Monongahela West Penn Public Service Co	37	9 15* 3* 3* 4* 2* !*	International Dodge White Reo Studebaker Menominee Garford	Lang Dodge Reo Studebaker Menominee Garford	18 18 25 16 20 20	Hydro-E.ectric Rys Levia Tramways Montreal Tramways	1	4 2 1 1 1 25 1†	Gotfredson White Mack Gotfredson Chevrolet Yellow Yellow Yellow Versare	Gotfredson Mack Gotfredson Chevrolet Can. Car & Fdry Can. Car & Fdry Yellow Versare	
Co	5	5	Yellow International	Yellow Lang	21 18	New Brunawick Power Co Ottawa Electric Ry	1 5	3† 1 5	Versare Studehaker Ree	Versare Superior Ottawa Car Mfg Co.	20
Wisconsin Michigan Power Co.	19	2 7 7 2 1	Twin Ceach Yellow International International Reo	Twin Coach Yellow Auto Body Co. Eckland Reo	40 29 25 25 17	Toronte Transportation Commission	70	15 3 6 20 10 3	Mack Studebaker White Ye.low Mack Gotfredson Mack	Bender Studebaker Yellow Mack Getfredson Mack	29 21 29 29 29 18 25 29 7 25 29
Wisconsin Power & Light Co	14	8 2 1 3	Fageol-A.C.F. Menominee Menominee International	Fageol Badger Badger Eckland	29 21 16 26	Winnipeg E.ectric Co	16	2 3 10 3 3	Pierce Arrow Buick Mack Studebaker Ree	Pierce Arrow Buick Winnipeg Elec. Winnipeg Elec. Winnipeg Elec.	29 7 25 21 21
Wisconsin Public Service Corp	7	7	Yellow	Yellow	21	Total	1,801				

all, 27 electric railways were reported as ordering equipment of this type last year.

Only 63 double-deck buses were purchased in 1927 by the electric railways. This figure is smaller than that of any of the preceding three years. All three of the purchasers were large city companies which already had double-deck equipment in service. They were the Philadelphia Rapid Transit Company, which bought 50, the Cleveland Railway, eight, and Los Angeles Railway, five.

The increase in the number of electric railways operating buses from 333 at the beginning of the year to 351 at its close was proportionately smaller than the increase in the number of buses operated. This was a natural development, however, because a large majority of the railways situated where buses can be used to advantage had already undertaken bus operation at the beginning of the year. Because of operations carried on jointly with other railways, however, and because operations sometimes are carried out by holding companies in the name of their subsidiaries and in other instances by subsidiaries in the name of holding companies, the total number of railways operating is more a matter of opinion than of exact calculation.

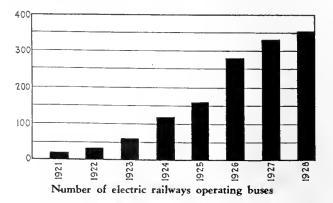
Among the railways now operating buses which were not so listed a year ago are the Chicago Surface Lines, Washington, Baltimore & Annapolis Electric Railroad, Central Passenger Railroad at Atlantic City, N. J., New York and Stamford Railway, Poughkeepsie & Wappingers Falls Electric Railway. Oregon Electric Railway and Levis Tramways. The Reading Transit Company reappears on the list after having been dropped when bus

operation was discontinued some time ago. The Louisiana Electric Company at Lake Charles and the Shawnee-Tecumseh Traction Company in Oklahoma discontinued all rail operation and now operate only buses.

A number of companies which reported bus service a year ago are no longer on the list. The Waterbury & Milldale Tramway sold its buses to an independent operator, but continued its rail operation. The New Bedford & Onset Street Railway suspended all operation and bus service is now furnished by an independent agency. The Menominee & Marinette Light & Traction Company sold its bus equipment, as did the Philadelphia & Western Railway. The Mesaba Railway in Minnesota sold its buses to the Northern Pacific Railroad. In Canada the Windsor, Essex & Lake Shore Rapid Railway discontinued its bus operation altogether.

Nearly 3,200 miles of extensions were made last year to the bus route mileage of the electric railway systems. This was the largest increase in any recent year. Intercity bus route extensions were made by 53 electric railways and amounted to 2,840 miles. This was greatly in excess of the intercity bus route mileage added in 1926, which was only 1,830 miles. City bus extensions were made by 82 electric railways totaling 560 miles. This was somewhat less in 1926 when city bus route extensions totaled 840 miles.

From the foregoing figures it will be seen that the gross increase in route mileage for the year was approximately 3,400. Slightly more than 200 miles, however, was reported as having been abandoned during the year. Eighteen electric railways found it advisable to



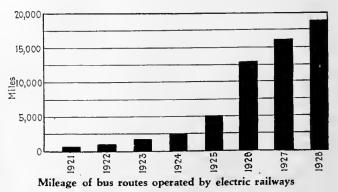


Table III—Bus Route Extensions During 1927

		110	acc	Datemotoris During 192	- (
Name of Railway	City Miles	Intercity Miles	Replaced Miles	Name of Railway Mi		Intercity Miles	Replaced Miles
California				New Jersey			4.11100
Bakersfield & Kern Electric Ry Key System Transit Co	0.50 3.65			Public Service Ry	• • •	259.77	
Market Street Ry	7.06			New York Binghamton Ry	. 60		
Municipal Ry. of San Francisco. Pacific Electric Ry.	6.40	24.40		Buffalo & Erie Rv	. 00	91.00	
San Francisco, Napa & C. listoga Rv		41.60		United Traction Co	. 21		6.46
Sauta Barbara & Snburban Ry Southern Pacific Co	2.00	146.00	18.77	Jamestown Street Ry	. 00		2.00 2.30
Connecticut				New York & Stamford Ry		43.17	23.13
Connecticut Co	9.31	29.02	13.28	North Carolina Durham Public Service Co	- 21		0.21
New Haven & Shore Line Ry	• • • • • •	9.25	9.25		. 21		0.21
District of Columbia Capital Traction Co.	10.08		1.13	Ciocinnati Street Ry	. 80	*56.00	
Capital Traction Co	6.77		1.12	Cleveland Ry	. 60		
Florida				Community Traction Co	. 80	7.50 3.20	5.00
Miami Beach Ry	17.00		6.10	Ohio Public Service Co	.75		2.40
Idaho			4 00	Okłahoma			
Boise Street Car Co	4.00	• • • • • •	4.00	Oklahoma Union Ry	. 50	31.00	****
Aurora, Elgin & Fox River Electric Co		22.00		Oklahoma Union Ry		9.51	9.51
Central Illinois Public Service Co	2 50		1.19	Oregon			
Chicago Rys. Chicago & West Towns Ry.	1 50		• • • • •	Portland Electric Power Co	. 00		
East St. Louis & Subhrban Ry		32.40		Pennsylvania		1 (0	
Gary Rys	6.40			Altoona & Logan Valley Electric Ry 0 Erie Ry 5	. 60 . 80	1.60	
Illinoia Power Co. Illinois Power & Light Corp.	24.12		24.12	Johnstown Traction Co 8	.00		
Indiana					. 50		
Indianapolis Street Ry	13.23			Northweatern Electric Service Co 9	. 80		
Codes Parido & V.				Philadelphia Rapid Transit Co	. 50	126.22 7.50	
Cedar Rapida & Iowa City Ry Fort Dedge, Des Moines & Southern R.R		33.00 300.00		Pittsburgh Rvs	. 80	*100.00	
Iowa Southern Utility Co Tri-City Ry	4.65		3.75	Reading Transit Co	• • •	11.30 41.00	10.12
	0.35	• • • • • • •		Scranton Ry 7	. 30	*50.00	2.00
Kansas Kansas City, Lawrence & Topeka Electric R.R		7.00	7.00	Shamokin & Edgewood Electric Ry		2.00 2.30	2.30
Kansas City, Leavenworth & Western Ry	1.07	1.58	4.83	Westmoreland County Ry		13.00	
Kanaas Electric Power Co	4.00		1.50	West Penn Rya.		4.00	3.92
Kentucky Traction & Terminal Co	1 55			Rhode Island United Electric Rys	. 45	38.33	27.01
Kentucky Utilities Co	1.55 2.45		2.45	South Dakota			
Louisiana				Sioux Falls Traction System		280.00	
Louisiana Electric Co	9.05		10.20	Texas			
Maine	2.75			Austin Street Ry	. 10 . 20		0.81
York Utilities Co		19.00	31.50	Eastern Texas Electric Co 8	. 90	19.84	0.01
Maryland				Houston Electric Co	. 63 . 44		
Cumberland & Westernport Transit Co. Potomac Ediaon Co.	3.05	11.20 131.05	11.20 1.26	Wichita Falls Traction Co	. 50		
United Rys. & Electric Co	4.80			Ufah			
Washington, Baltimore & Annapolis Elec. R.R	9.00	29.00			. 50	10.21	2.50 9.51
Boston Elevated Ry	5.03			Utah Light & Traction Co		10.21	7. 31
Doston, Worcester & New York Street Rv	£ 50		1.50	Burlington Traction Co	. 60		0.50
Eastern Massachusetts Street Ry. Gardner-Templeton Street Ry.		46.00 8.50		Virginia Panelso Pay & Floatric Co.	00	1.00	
Middlesex & Boston Street Rv		16.10	10.65	Roanoke Ry. & Electric Co	.38	1.00	10.00
Springfield Street Ry. Worcester Consolidated Street Ry.	1.23	68.32 69.00	41.23 58.23	Washington			
Michigan		57.00			. 60 . 00		
City of Detroit, Department of Street Rya Detroit United Ry	53.68			West Virginia			
Grand Rapids, Grand Haven & Muskegon Ry	12.70	44.00		Charleston Internrban R.R		190.00	1110
Michigan Electric Ry.	0.77		0.77	Monongahela Weat Pena Public Service Co 16 Wheeling Traction Co		54.60 40.00	1.10
Minnesota				Wisconsin		0.6.00	
Duluth Street Ry. Twin City Rapid Transit Co.	9.00 1.10	• • • • • •		Wisconsin Power & Light Co	. śò	85.80 10.40	40.55 10.81
Mississippi	7.10			Canada			
Mississippi Power & Light Co	2.30		2.30		. 97 . 78	138.00	1.79
Missouri					. 30	158.00	1.75
Kansas City Public Service Co	2.55		11.00	Porto Rico			
Missouri Power & Light Co St. Louis Public Service Co	2.04	2.00	2.00	Ponce Electric Co	. 50		1.10
Nebraska				Total 561	. 94	2,838.67	455.66
Lincola Traction Co	14.44		10.67	* Sightseeing or touring.			

discontinue certain bus routes or parts of routes for various reasons, usually because of lack of adequate patronage to make the line profitable.

Adding the net increase of 3,200 miles to the 15,000 miles of bus route operated by electric railways at the beginning of the year a total mileage of considerably more than 18,000 is indicated today. Of this total, however, only a comparatively small amount represents replacement of electric railway service. The cumulative total of track on which car service had been replaced by bus service was 1,400 miles on Jan. 1, 1927. During the past year bus service replaced car service on approximately 470 miles of track, making the present total of

track which has been abandoned in favor of the bus about 1,900 miles.

Other automotive equipment bought during the past year totaled 207 vehicles, including freight and express trucks, service trucks, tower trucks, dump trucks and snow handling equipment. For 1926 this total was 347. The biggest purchaser of automotive service equipment in 1927 was the Milwaukee Electric Railway & Light Company, which bought 40 such vehicles. The British Columbia Electric Railway purchased 23 vehicles, including freight and express and service cars, the Boston Elevated bought 17 vehicles and the Public Service Railway sixteen.

\$39,676,000 of Bonds Placed

Bulk of financing was done by city systems at prices that compare favorably with those to other borrowers under present conditions. Maturities for year much lower than for 1927

TITH one exception the financing done in the electric railway field in 1927 was for amounts running into large figures. The outstanding issue was, of course, the offering of \$18,000,000 of Twin City Rapid Transit Company first and refunding $5\frac{1}{2}$ per cent gold bonds, placed with investors at a price to yield about 5.70 per cent. Next in importance in the order of size came the Cincinnati Street Railway issue, placed in April with investors at an even 5 per cent yield. Next in size came the two Boston issues, one for \$4,626,000, placed in January, to yield 5 per cent, and the other for \$1,885,000, placed in April, to yield 4.936 per cent.

The \$2,000,000 Omaha & Council Bluffs Railway & Bridge issue was placed in November, to yield 6 per cent. The Chicago Rapid Transit issue of \$1,795,000 was placed in May, to yield 6.565 per cent. The Denver Tramway issue of \$1,750,000, placed in March, to yield 6,304 per cent, and the Philadelphia Rapid Transit Company equipment trust issue, placed in February, to yield 5 per cent, were somewhat different in character from the others. The total of \$39,676,000 was greatly in

Table I—Nine-Year Record of New Electric Railway Financing Involving Bond or Note Issues of More Than \$500,000

	City Railway	Interurban	Suburban
1919	\$22,800,000	\$6,050,000	\$7,550,000
1920	2,250,000	2,340,000	4,200,000
1921	11,740,000	1,900,000	7,250,000
1922	865,000	750,000	27,138,000
1923	14,562,000		6,305,000
1924	50,797,000	21,731,600	11,414,000
1925	23,141,000	750,000	486,000
1926	2,100,000	6,500,000	2,500,000
1927	38,956,000	720,000	0

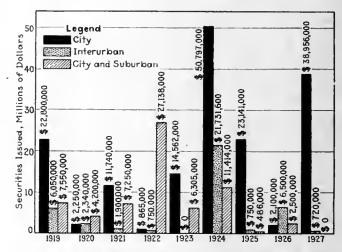
excess of the total for the previous year, as the nine-year comparative record shows. That record also shows that the preponderance of the financing was done by the large city companies. Of course, there were some issues smaller in size that are not included in the table, which only shows amounts of \$500,000 publicly offered. Their inclusion, however, would not make any material difference in the total. All the issues were placed at an average yield to the investor of approximately 5.5 per cent.

Maturities for this year are way below the figure for 1927, being \$47,577,200, compared with \$180,798,000 in 1927. Of this \$47,577,200 the two Omaha issues account for \$10,918,000 and the two Minneapolis issues for \$15,000,000. One of the Omaha maturities has already been arranged, and the Minneapolis issues are taken care of by that company's recent financing. This leaves a total of only a little more than \$21,000,000 of maturities to be arranged in a period of easy money.

The amount of bonds in default has increased materially during the year, being more than \$260,000,000, compared with more than \$180,000,000 during the

previous year. This is accounted for largely by the various Chicago issues, totaling more than \$85,000,000. The interest on these issues is being paid, but the bonds were not refunded because of the failure of the city of Chicago to work out a new operating arrangement with the railway. In the table in which this subject is covered there is a default as to principal as well as to interest only where the maturity date appears after the issue. Technical defaults are not included in this tabulation.

This year it has been possible, with the aid of the



The securities issued for electric railway properties last year reflect the large amount of refinancing necessary

American Electric Railway Association, to publish an additional table showing the disposition which was made of the issues that matured during 1927. The column which records the information that was available is self-revealing. It is significant in its showing of issues retired. Some of the large issues were refunded, and there appears to have been little trouble in negotiating this outcome or in arranging for the extension of the issue where that was deemed desirable. As a matter of fact, eighteen of the issues maturing were retired, against less than a dozen issues either refunded or extended. It is significant that the issues that were retired totaled more than \$6,000,000.

One of the most interesting events of the year was the readjustment of finances by the Grand Rapids Railway as a result of which that company was succeeded by the Grand Rapids Railroad. It will be recalled that a plan of readjustment was suggested for the Grand

Table II—Comparison of Maturities in the Electric Railway Field

1927	180,798,000 26,644,790 28,224,000	1923	160,015,860 207,617,530
------	-----------------------------------------	------	----------------------------

Table III—Statement of Disposition of Principal Electric Maturities in 1927

January			June		
Rate	Amount	Disposition	Rate	Amount	Disposition
Chicago City & Connecting Railways clt	\$20,616,000 579,000	Default Retired	Galveston-Houston Electric 2-year 7 Berkshire Street Railway 7 Buffalo, Bellevue & Lancaster 1st 5	\$1,200,000 777,000 215,000	Refunded Extended
Springfield & Eastern Street Railway 1st 7	450,000 330,000	Retired Retired	July	\$2,192,000	
Eastern Massachusetta Street Railway serial	300,000		Lorain & Cleveland Railway Ist 5	\$750,000	\$450,000 retired and \$300,000 extended.
lst	280,000 200,000 200,000 375,000	Retired Retired Retired Retired	August United Railways & Electric Company of	\$750,000	
	\$23,330,000		Baltimore 5-year	\$2,500,000	
February Chicago Railways 1st	\$55,655,000	1	truat G	237,500 234,000	Retired Retired
Chicago City Railway lat	33,926,000 17,164,470	Principal in default	Septembe	\$2,971,500	
Chicago Railways Consolidated A 5 Calumet & South Chicago 1st 5	16,703,800 5,458,000	but interest being paid.	Worcester & South Bridge Street Ry 7		Extended to Aug. 1,
Chicago Railways purchase money 5 West End Street Railway dehenture 6	3,969,300 2,700,000	Refunded Defaulted	0.43	\$500,000	1930 at 6 per cent.
Chicago Railwaya income 4 Philadelphia Rapid Transit equipment	2,500,000	Detauted	October		
trust G 5½	237,500		South Bend & Southern Michigan Railway lat	\$750,000	Extended
Hagerstown & Northern Railroad 1st. 5 Pittsburgh Railways car trust 6	200,000 200,000	Ratired Retired	Pittaburgh Traction lat	684,000 65 7, 000	Extended Extended
	\$138,714,040			\$2,091,000	
March Interborough Rapid Transit equipment			November		
trust A 6	\$280,000	Retired	Worcester Consolidated Street Railway debanture	\$1,200,000	Extended
April	\$280,000	Refunded	trust C	570,000	Retired
Denver City Transway extended 6 Denver Transway Power extended 6	\$2,000,000 693,000 618,000	Retired Defulated	Description	\$1,770,000	
Des Moines City Railway 5-year 7 Enid City Railway 1st	235,000	Definated	Philadelphia Rapid Transit equipment		
May	\$4,403,000		trust H	\$270,000 458,690	Retired Extended
West End Street Railway 5-year 6	\$1,956,000	Refunded	guaranteed	247,560	
Jacksonville Electric (new traction) lat 5 New Castile Traction lat	1,245,000 470,000	Retired	-	\$975,560	
	\$3,271,000		Total 1927	\$180, 7 98,000	

Rapids Railway, Grand Rapids, Mich., which contemplated the organization of a new company to take over the assets of the old company and the cancellation of all of its common stock and extinguishment of \$600,000 of its indebtedness through the issue of common stock of the new company, and the exchange of preferred stock on the basis of two shares of new company common

stock for one share of old preferred stock, the depositors of which were also offered subscription rights. The plan also provided for the authorization of additional preferred stock by the new company to provide funds further to reduce existing indebtedness and for other corporate purposes. It was explained that the changes suggested were deemed advisable at the time because

Table IV-Principal Electric Railway Maturities in 1928

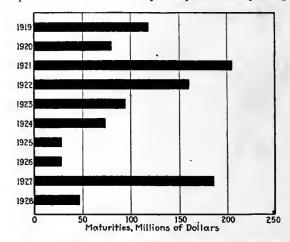
January Rate Amount Amount Amount Amount Sa,995,000 Chicago, North Hudson County Railway consolidated. 5 \$2,998,000 Chicago, North Shore & Milwaukee five-year. 2,684,200 Chicago, North Shore & Milwaukee five-year. 5,298,000 Chicago, North Shore & Milwaukee five-year. 5,288,000 Chicago, North Shore & Milwaukee five-year. 5,288,	(Ba	(Based on Dow, Jones & Company's Compilation)									
Omsha & Council Bluffs Railway & Bridge consolidated 5 1,22,000 Chicago, North Shore & Milwaukee five-year. 2,684,200 Chicago, North Shore & Milwaukee five-year. 2,684,200 1,22,000 Lake Street Elevated Railroad Ist. 5 1,598,000 5 242,000 Lake Street Elevated Railroad Ist. 5 242,000 1,598,000 Lake Street Railway Ist. 7 242,000 Lake Street Railway Ist. 7 242,000 Lake Street Railway Ist. 7 242,000 This field Electric Street Railway Ist. 7 242,000 August \$7,522,200 \$7,522,200 This field Electric Street Railway Ist. 9 \$7,522,200 Philadelphia Rapid Transit equipment trust G \$1 237,500 237,500 Philadelphia Rapid Transit equipment trust G \$1 237,500 \$0,000 None and the street Railway Ist. \$1 237,500 \$1 \$0,000 None and the street Railway Ist. \$1 \$2,000 \$2,000 None and the street Railway Ist. \$2 \$3,000 North Shore & Milway Ist. \$2 \$3,000 Philadelphia Rapid Transit equipment trust G \$2,000 \$3,000 North Shore & Milway Ist. \$3 \$3,000	January	Rate	Amount	i							
Oklahoma Railway collateral H notes 8 \$25,000 Lake Street Elevated Railroad 1st 5 1,598,000 242,000 Stark Electric Railroad 1st 5 730,000 Pittsfield Electric Street Railway 1st 7 7 242,000 Los Angeles & Pasadena Electric Railway 1st 5 628,000 450,000 August \$7,522,200 Milford & Uxbridge Street Railway 1st 7 335,000 Philadelphia Rapid Transit equipment trust G 5½ 237,500 Pennsylvania & Maryland Street Railway 1st 5 216,000 Minneapolis Street Railway 1st 5½ 5,000,000 Brooklyn City Railroad equipment trust 5 375,000 4 55,237,500 \$5,237,500											
Stark Electric Railroad lst.			825,000	Lake Street Elevated Railroad 1st	5	1,598,000					
Interborough Rapid Transit equipment trust B	Stark Electric Railroad let	5	730,000	Pittsfield Electric Street Railway 1st	7	242,000					
Millord & Uxbridge Street Railway 1st 7 335,000 August Eastern Massachusetts Street Railway serial. 6 300,000 Philadelphia Rapid Transit equipment trust G. 5½ 237,500 Pennsylvania & Maryland Street Railway 1st. 5 216,000 Minneapolis Street Railway 1st 5½ 5,000,000 Brooklyn City Railroad equipment trust. 5 375,000 *5,237,500 \$5,237,500						\$7,522,200					
Pennsylvania & Maryland Street Railway 1st. 5 216,000 Brooklyn City Railroad equipment trust. 5 375,000 Significant Street Railway 1st. 5 5,237,500 Significant Railway 1st. 5 5,237,500	Milford & Uxbridge Street Railway 1st	7				, ,					
Brooklyn City Railroad equipment trust											
\$5,237,500				Minneapons Street Ranway 1st	23	3,000,000					
	Discours City Italiano (quiphiese trast					\$5,237,500					
73.4	Fohmony		\$14,777,000	September							
Atlantic City & Shore Company collateral	The state of the s	4	501.000	Southwest Missouri Electric refunding	6	1,150,000					
Pittsburgh Railways four-year	Pittsburgh Railways four-year	6	500,000		-	\$1,150,000					
Philadelphia Rapid Transit equipment trust G	Philadelphia Rapid Transit equipment trust G	51									
Pittsburgh Railways car trust	Pittsburgh Rahways car trust	0	200,000	Minneapolis Street Railway & St. Paul City Railway joint		¢10 000 000					
\$1,528,500			\$1,528,500	Gonsonared	,	\$10,000,000					
March \$10,000,000				No.		\$10,000,000					
Interborough Rapid Transit equipment trust A	Interborough Rapid Transit equipment trust A	. 6	280,000			1 500 500					
\$280,000 Springfield & Urbana Electric Railway 1at			\$280,000	Interborough Rapid Transit could ment trust C	6						
May				Interpotough Impid Xianos equipment to account the title	•						
New York City Interborough Railway 1st	New York City Interborough Railway 1st	4	\$2,164,000	December		\$2,070,000					
\$2,164,000 Buffalo & Lackawanna Traction lat			\$2,164,000		5	\$1.160.000					
June Philadelphia Rapid Transit equipment trust H	June		4=,101,000								
Blue Ridge Transportation Company (Maryland)	Blue Ridge Transportation Company (Maryland)	5		Hamilton Railway lat	5	220,000					
Monongahela Street Railway 1st	Mononganela Street Railway Ist	5	998,000			\$1,650,000					
\$1,198,000			\$1,198,000								
Total 1928											
Total 1927 \$180,798,000				Total 192/		\$180,798,000					

Table V—Details of New Bond and Note Financing in Amounts of More than \$500,000 Offered Publicly in 1927

r Janu	агу			杨
Issue	Price	Maturity	Yield	Amount
Boston Elevated Railway ten-year gold 5's	100	1937	5	\$4,626,000
Febru	агу			
Philadelphia Rapid Transit Company serics K 5's	100	1927-36	5	1,900,000
Mar	ch			
Denver Tramway first consolidated sink- ing fund 6's	98.50	1933	6.304	1,750,000
Apr	41			
Cincinnati Street Railway first general 5's, series "A"	100	1952	5	7,000,000
Boston Elevated Railway ten-year gold 5's	100.75	1937	4.936	1,885,000
Ma	y			
Chicago Rapid Transit first and refund- ing 6's	93	1953	6.565	1,795,000
Nover	nber			
Omaha & Council Bluffs Railway & Bridge Company first (closed) mortgage 6 per cent sinking fund gold bonds	100	1947	6	2,000,000
Decen	nber			
Twin City Rapid Transit Company first lieu and refunding 5½ per cent gold bonds, series "A"	97	1952	5.70	18,000,000
gold certificates	101.260 to par		51-51	720,000
Total				\$39,676,000

of the large floating indebtedness of the old company and its lack of a medium for doing any financing other than through first mortgage bonds which could not be issued and sold in sufficient amount or at advantageous prices in view of the company's condition. The former floating debt position dated back to June 1, 1919, when three-year bonds amounting to \$3,700,000 became due, which bonds were in turn issued to refund the long term 5 per cent bonds originally issued in 1900. The details of this plan were reviewed in the Electric Railway Journal for April 16, page 718.

Progress is also reported on the plan of readjustment of the capitalization of the many companies comprising the



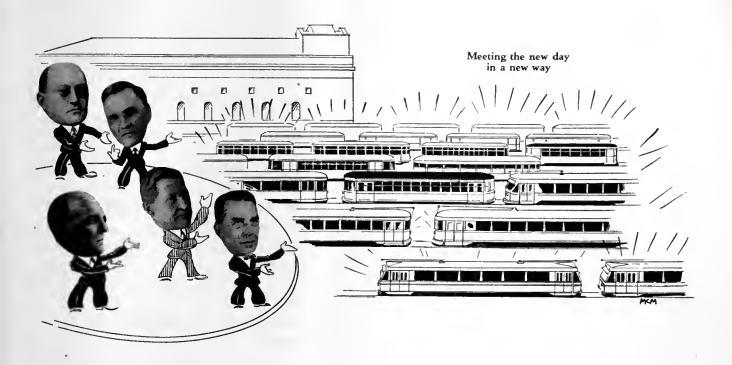
In 1928 there will be a material reduction in maturities following the unusually large number last year

Pittsburgh Railways system intended to bring all of these properties into the ownership of one company with a simplified financial structure. It is hoped that some definite workable arrangement will develop in the near future.

Table VI—Outstanding Electric Railway Bonds in Default of Interest

(Compiled by Dow, Jones & Company)

	Amount	Defau	lted		Amount	Defau	lted
Auburn & Syracuse Elec. R.R. 5's. Bingbamton Railway cons 5's. general & refunding 6's.	\$1,752,000 1,833,000 426,200	April, May, July,	1926 1926 1925	Kansas City, Lawrence & Topeka 5's Kansas-Oklahoma Traction 6's Lakeside Railway 1st 6's	\$400,000 250,000 150,000	Sept., Nov., May,	1919 1924 1926
Binghamton Railroad 6's, 1925 Binghamton, Lestershire & Union 5's, 1925 Boise Valley Traction 5's, 1925	452,000 147,000 750,000	July, June, Jau.,	1925 1925 1923	Lima, Findlay & Toledo 5'e, 1925 Lowell & Fitchburg St. Ry. 5's, 1926	324,000 275,000 7,190,500	July, Jan., Jan.,	1925 1926 1925
Boise & Interurban Ry. 1st 5's	964,000 1,150,000 5,532,000	April, Dec., Feb.,	1923 1918 1927	Michigan Railroad 1st 6's, 1924	4,050,000 165,000 335,000	May, July, July,	1924 1925 1925
Chatham, Wallace & Lake Erie 5's, 1925	694,500	July, Jan.,	1925 1922	Milford & Uxbridge St. Ry. 7's Minneapolis, Anoka & Cuyuna Range Ry. 5's Mississippi Valley Ry. & Pwr. 5's	380,000 800,000	Nov., July,	1925 1917
Chicago City & Connecting Railways 5's, 1927 Chicago City Railway 5's, 1927 Chicago Railways, 1st 5's, 1927	20,616,000 33,926,000 55,655,000	Jan., Feb., Feb.,	1927 1927 1927	Morris County Traction, Newark, N. J., 1st 5's Muncie, Hartford & Ft. Wayne 5's Muncie & Union City Traction 5's	3,000,000 916,000 925,000	June, Jan., Jan.,	1922 1925 1925
consolidated A 5's, 1927. consolidated B 5's, 1927. purchase money 5's, 1927. adjustment income 4's, 1927.	16,703,800 17,164,475 4,073,000 2,500,000	Feb., Feb., Feb.,	1927 1927 1927 1927	New York & Queeus County Ry. cons. 4's Ogdensburg Street Railway 6's Olean, Bradford & Salamanca Ry. 7's	1,300,000 150,000 264,000	Sept.,	1922 1925 1926
Clinton Street Ry., Clinton, Ia., 1st 5's, 1926 Columbus, London & Springfield 5's, 1920 Detroit, Altmont & Northern 6's	400,000 1,260,000 400,000	April Oct., Aug.,	1926 1920 1925	Penn Street Ry., Pittsburgh 1st 5's, 1922 Pittsburgh, Crafton & Mausfield 5's, 1924 Pittsburgh & W. End Pass. Ry. 5's, 1922	250,000 171,000 313,000	June, July, July,	1922 1924 1922
Detroit, Jackson & Chicago 5'a Detroit, Monroe & Toledo Short L. 5's Detroit & Port Huran Shore Line 5'a	881,000 3,000,000 2,500,000		1925 1925 1925	Puget Sound Electric Ry. cons. 5's	2,427,000 2,448,500 1,431,900 150,000		1927 1927 1925 1925
Detroit United Ry. coll. tr. 6's	8,472,000 640,000 1,610,000	July, Aug., Aug.	1925 1925 1925	Schuylkill Railway lst 5's. Schuylkill Traction lst 5's. consolidated 4½'s.	180,000 500,000 105,000	April, April, July,	1926 1926 1926
Geneva, Seneca Falls & Auburn 5'a	497,000 1,500,000 6,400,000	Jan., Jan., Nov.,	1926 1926 1919	Second Avenue R.R., New York, cons. 5'c	5,682,000 3,140,000 1,500,000	Aug., Oct., July,	1908 1914 1922
Indiana Northern Traction 5's	500,000 1,126,000 1,400,000		1925 1925 1923	South Bend & So. Mich. Ry. 5's, 1927 Southwest Missouri Electric 6's Southwest Missouri R.R. 5's	750,000 1,150,000 1,034,000	Sept.,	1927 1926 1926
Indianapolis, Newcastle & East 6's Indianapolis Northern Traction 5's Indianapolis, Shelbyville & S. E. 5's	1,200,000 5,000,000 413,000	Jan.,	1925 1925 1923	Syracuse, Lake Shore & Nor. 5's	2,500,000 413,800 4,623,000	March	1927 1925 1925
Indianapolis & Southeastern Tr. 5's Inter-Urban Railway, Des Moines, 1st 7½'s debenture 6's	586,000 652,500 250,000	April,	1923 1927 1923	Union Traction, Coffeyville, Kau. 5's	900,000 5,773,000 125,000	Jan.,	1925 1922 1923
Ithaca Street Ry. 1st 6's, 1922	175,000 488,000		1922 1922	Youngstown & Ohio River 1st 5's	1,200,000		1927
Jackson Consol. Traction 5's	790,000 343,000		1925 1925	Total in default	\$264,371,175		



Only a Mint Doesn't Need to Merchandise

There are no dusty answers here. A new day is being greeted in a new way by the railways in the work of finding the open sesame to the future

By G. J. MacMurray
News Editor Electric Railway Journal

IN HUBBARD was all wrong. It's not so difficult to write a recommendation for some one you know. As a matter of fact, this industry is like the tea kettle. It may have been up to its neck in hot water, but it has continued to sing. And its song is not the song that Liberty thought it was. Nor is it by any means the song that Mr. Chrysler sang when he wrote "The Trolley Car Is Doomed" in Collier's for July 16. He and the others who have sprung to the bedside of the electric railways, fountain pens in hand, ready to write the obituary of this industry are to be forgiven for their absurdities. They need to be reminded that a shrill note from the whistle of a peanut wagon can always be counted upon to cause a stream of

people to turn their heads as they rush along the street.

Returning to a study of this industry after a year's vacation, my curiosity was at first mild, but after I'd looked over statistics put out by Messrs. Storrs, Murphy and Dell, had sat down with Mr. Wickwire's little brochure "The Autobiography of a Thin Dime," read the speeches made at Cleveland and gone through 2,342 pages of the JOURNAL for 1927 the matter became scientific and intense. So, scientific and intense we are for the moment.

The revenue passengers carried during the first nine months of 1927 by 217 companies which report monthly to the American Electric Railway Association vary from 1.44 per cent increase in January to 3.85

decrease in July. For the whole nine months there is a decrease of 0.7 per cent.

Prof. Albert S. Richey's figures for street railway fares and electric railway materials and wages appear elsewhere in this issue. The fare tendency has been upward in recognition of good service, the national average being 8 cents. Some 116 major cities in the United States have a 10-cent cash fare. This group represents a large majority of the nation's mileage.

As if that were not enough in the way of figures to give this recital an authoritative touch, Freddie Dell, whose diet is figures, "conventionally speaking," supplied the statement on the next page just before he left on Jan. 3 for a vacation in Havana.

These are merely high spots. They are almost as succinct as the reply of the little boy at school who when asked to tell who Patrick Henry was and what he did, replied that "Patrick Henry was a young man and he lived in Virginia. He had blue eyes and light hair. He was married, and he said: 'Give me liberty or give me death."

THE BIGGEST ROOM IS THE ROOM FOR IMPROVEMENT

Well, anyway, the electric railways are finding out that the biggest room in the world is the room for improvement. It is not all sunshine and roses, but the best news is that many properties, small as well as large, with few exceptions are coming back. Look at the moderate-sized properties, other than Grand Rapids, which entered the contest for the Coffin Award. Consider Little Rock! Take a look at Durham! St. Louis \$1,500,000 expenditure of the Cincinnati, Hamilton & Dayton Railway, the extensive program of the Cincinnati Street Railway, the \$175,000 cut-off of the Milwaukee Electric Railway & Light Company, the work on the properties at Norfolk and Williamsport and the \$680,000 program at Minneapolis, not forgetting the \$3,000,000 program for Kansas City, all in the way of special expenditures. Certainly no shop installation exceeded in magnitude that of the B.-M. T.

The instances cited do not, of course, run the gamut of all the work done, but they indicate the willingness of the companies to spend money in order to make it. Detroit will not get its downtown dips, but there is no telling about the billion dollar plan of Henry A. Blair to develop and co-ordinate the surface cars, elevated lines and buses in Chicago. The new plan of rapid transit in

\$3,500,000 expansion program for the municipal system with track extensions totaling 11.6 route-miles and 47 additional cars and 26 buses. J. Rowland Bibbins contributes to the history of the year with his article "Problems of Mass Transportation" in the issue for April 23 and with his recommendations for Philadelphia. Also in Philadelphia Expert Simmons advised an agreement for Broad Street tube operation only and Dr. Snow suggested the expenditure of \$77,000,000. The program of the Piedmont & Northern for carrying out its \$50,000,000 expenditure has been frowned upon by the I. C. C. examiners, but that case is not yet off the docket.

MUNICIPAL OPERATION No Panacea

San Francisco's municipal road is having hard sledding and Seattle doesn't seem to know whether it is coming or going. As for the Detroit Municipal system, it is in the cards that something heroic in the way of fare changes must be done soon.

In Chicago political bickering prevented the consummation of a new franchise deal and the whole matter is again the subject of conferences. One cannot pass the wonderful record of the Surface Lines without mentioning that the men there, comprising the largest labor local in the industry, reminded fellow unionists of other trades that nothing was to be gained by idle baiting of the railways.

Kansas City got a new franchise, but the situation in Toledo is still unsettled. The value of the St. Louis properties has been fixed at \$58,157,-236 and the company has come out of receivership, but the franchise matter remains to be settled. The question of renewing the Boston Elevated agreement for operation under public control is now before the Legislature.

Note the "Axe" in Taxes

Among the paving relief measures was the one passed in New Jersey. The issues it was expected the socalled O'Fallon case would settle still remain undecided, but as William A. Prendergast of the New York State Commission pointed out in a paper before the annual convention of the Railroad and Utility Commissioners held in Dallas, Tex., the courts have ruled that the cost of reproduction shall be recognized as the present value and should be so accepted. The burden of taxation that the railways bear was made plain by Leslie

The Convention Record Reduced to Figures

				0	
Year	Convention City	Convention Registration	Number of Manu- facturer Company Members	Number of Exhibitors at Convention	·Total Space Sold, Square Feet
1916	Atlantic City	3.271	208	125	57,329
1917	New York	Conference only	171	No exhibit	No exhibit
1918	New York	Conference only	171	No exhibit	No exhibit
1919	Atlantic City	3,166	206	157	62,219
1920	Atlantic City	3,300	200	136	59,529
1921	Atlantic City	1,189	225	No exhibit	No exhibit
1922	Chicago	4,200	244	141	61,895
1923	Atlantic City	4,404	274	162	75,681
1924	Atlantic City	5,804	330	192	86,349
1925	Atlantic City	7,147	371	204	100,030
1926	Cleveland	8,623	423	271	114.797
1927	Cleveland	8,024	445	293	116,634

came out of receivership. The Chicago, North Shore & Milwaukee Railroad again hung up new records. In Chicago 1,574,969,902 people rode the Surface Lines in a year. As for the reorganized Cincinnati, Hamilton & Dayton road, the balance remaining for that property after fixed charges and depreciation was 55 per cent in excess of the estimates made by the reorganization committee. Pittsburgh also did well despite a decrease of \$113,998 in gross earnings for the year due to the economic situation there.

Money Is a Boomerang; TURN IT LOOSE

Best of all, the electric railways are learning that money is a boomerang. To go over all rehabilitation programs would be impossible. Aside from the program of the New Haven for its Springfield and Worcester properties, there was the rehabilitation of the South Shore Line, the completion of the \$4,000,000 job of electrifying the Bay Ridge division M. M. O'Shaughnessy, city engineer of the Long Island Railroad, the of San Francisco, told about the

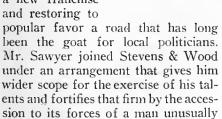
northern New Jersey has been advanced, and co-ordination has been recommended for St. Louis and rapid transit for Cincinnati under the Beeler plan. Engineer Smith sees waste in the building of cityowned lines in New York City and suggests a fare increase with a unified system, but Samuel Untermyer wants New York City to recapture the lines built with city money but privately operated so as to tie them into the new lines being built by the city. In the matter of transit Mayor Walker and Comptroller Berry have stopped calling each other names.

Some progress has been made on the plan to have the Public Service Company of New Jersey use the old canal bed in Newark. The \$12,000,-000 Dorchester Rapid Transit extension at Boston was placed in service and Rochester's new rapid transit line was opened. Again, at Boston there was unusual interest in the plan of the Wells interests to take over and electrify the narrow-gage line. M. M. O'Shaughnessy, city engineer

Vickers, economist of the association, at the hearing in Washington before the ways and means committee, in which he brought out the fact that one cent of revenue out of every ten of the railways goes for taxes. This

recalls the fact that every evil contains the germs of its own destruction.

The year closed with Sam Greenland responsible operating head of the system in St. Louis and Jack Shannahan at Omaha, with the problem facing him of securing a new franchise



Soothing the Passengers' Nerves

well equipped as a utility expert.

As for the technical arts, this review is not intended to cover them. Suffice it to say that the improvement of cars still holds its place in the limelight. The bumps are being taken out of track on a wholesale scale and the battle between wood and steel for ties goes merrily along in the competition to give the passenger a smoother ride. If the process of soothing the passenger to relaxation continues, we shall next be faced with the need for alarm clocks to wake them when they reach their corners. There appears to be much interest in the automatic rectifier substation, noise prevention and our old friend rail corrugation. Pull-ins are still heing pulled down and better snowfighting methods are preventing holdups of service. No longer is it true of service that the man who decided to commit suicide by lying on the track starved to death before the car came along.

The Journal spurred writers on by its Maintenance Article Contest and preached amusing sermons by its cartoon, "Adventures of Old Man Trouble of the Hicksville Railway," while the writer of the Dick Prescott sketches appears to be just as prolific as ever. Moreover, there was the notable series of articles on foreign practices written by Henry W. Blake,

which served to expand the limits of electric railway thinking beyond our own shores.

In equipment there have been corresponding improvements, and in city service, where $1\frac{1}{2}$ to $1\frac{3}{4}$ m.p.h.p.s.



A smooth-working triumvirate

used to be considered good acceleration, motors capable of giving 3 m.p.h.p.s. are thought desirable. The earliest radical departures in equipment were in the construction of cars for the Springfield Street Railway and by the Chicago & Joliet Electric Railway with worm-gear drive. At the Cleveland show there blossomed forth an array of new ideas in cars, trucks, buses and equipment that

point of economy, convenience and comfort.

Newspaper advertisements show the great advance in thinking that is being made in the direction of selling the service of electric railways. Many of these efforts had strong rider appeal; others were directed to the consideration of economy in railway riding. But the important thing is that the copy is being written to sell a product. Just as the production of an artistic poster presupposed the hiring of a real artist, so electric railways are coming to see the need for advertising copy writers with skill, imagination and understanding of crowd psychology. As Fred Erickson, advertising manager of the Milwaukee Electric Railway & Light Company, puts the railway advertising story, 'Keep on telling it in such a manner that the public knows about it and believes it. That is the secret back of advertising the transportation business." Still, some men in the railway business are as obdurate about the value of advertising as was the jeweler who did not wake up to the fact that advertising brings results until he advertised for a watchman and discovered the morning after the ad had been run that



Omaha gave Mr. Shannahan a royal reception

jolted the industry to a sudden real- his shop had been ransacked by ization of the speed at which we are burglars. moving. Thus through a gradual process of evolution transportation has entered the product class along with soap and candy. The public, ever receptive to something good, is beginning to have its attention directed to transportation as a product highly satisfactory from the stand-

RIDE THE TROLLEY WEEK

In Pittsburgh ride merchandising has developed a wide range of ingenuity, extending from cut rate and special short fares to the inauguration of a "ride the trolley" week, So well have they done their work there that a story comes from Pittsburgh that a flapper rode the cars all day because she misinterpreted a dash sign which read "The Loves of Carmen."

The importance of the movie in advertising railway service is evidenced by the activity of the American Electric Railway Association in arranging for the preparation and national distribution of ride-selling films. Of course no such stars as Greta Garbo and John Gilbert are to be shown unless perhaps they wish to indorse a de luxe safety car in preference to a Rolls Royce. How effective an advertising medium the movie really is was proved in Providence, R. I., recently when many people crashed the gate to see the picture "East Side, West Side, All Around the Town," presented by the railway. This ingenious version of the plight of the private automobile owner reminded one of Eugene Field's line about the German railroad train: "Fool that I was, I should have walked; I had no time to waste."

TRAINMEN DEVELOP POTENTIAL RIDERS INTO ACTUAL CUSTOMERS

Now these things are not inconsequential. Service must be sold and sold again. As a writer recently put it in the little poem "Secret of Service":

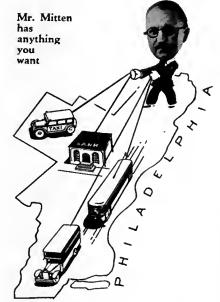
We may lay a splendid trackway,
We may build the finest cars,
Install the best equipment
To eliminate the "jars."
We may furnish every comfort
that the mind of man conceives;
Even issue scented transfers
On æsthetic gilt-edged leaves,
But to give you all real service.
That is service with a "throb,"
We must look to our street carmen
To be always on the job.

In the final analysis, trainmen are largely responsible for developing potential riders into actual customers. Prospect cards were resorted to by the Pacific Electric Railway, Winnipeg Electric Company and Elmira property whereby employees directly solicited new business. The thousand and one little touches that appeal to customers were pretty broadly employed by the various railway properties. In Evansville the company followed the practice used by Grand Rapids, Atlanta, Knoxville and other cities of naming the cars after the first settlers. In Cincinnati new insignia appeared on all the cars. An open house was held in Williamsport, Pa., and carnations were distributed to the ladies.

On this subject of actual custo-

mers Mr. Lemmon, of Stone & Webster, said: "Unless we know more about the other fellow's needs than he does and can point them out to him there is no reason to suppose that he will part with real money until he has become aware of his requirements."

Whether the utility plan of advertising included entertaining the Prince of Wales, as the International Railway did in Buffalo, or engaging an English economist to look into the inner workings of the employee ownership scheme existent in Philadelphia, or whether it was a trick of showmanship like the bonfire and civic celebration with which the Cincinnati, Hamilton & Dayton Railway introduced its new service, it is impossible



for this commentator to say. Long before the Coffin Award was to be made car riders in Grand Rapids knew that their vicinity was vying for honors with other cities throughout the country; civic pride was, therefore, aroused, and they awaited the outcome of the competition just as thousands awaited the new Ford model.

PROGRESS WITH THE BUS

Speaking statistically again, the Public Service Corporation of New Jersey holds the record for passengers handled on buses. On that system in 1926 199,640,564 passengers were carried by bus, compared with 397,690,310 passengers transported by trolley. Perhaps one of the most important bus developments of the year was the use of the bus for local hauls and the trolleys for long hauls in Detroit. This is an experiment that has attracted wide attention. And don't forget that T. E. Mitten had something very worth while to

say during 1927 in his interview, "Three Classes of Service."

In New York City the Board of Estimate granted a number of franchises for the operation of buses, but the grants have still to be certified as to their conveniences and necessity by the Transit Commission. Among the de luxe and sightseeing tours were those started by the Cincinnati Street Railway. The Twin City Rapid Transit Company went into the taxicab business in January. One of the most important situations to be righted during the year was at Indianapolis, in which city the Indianapolis Street Railway took over the Peoples Motor Bus Company.

MANY STERLING PAPERS PRESENTED AT MEETINGS

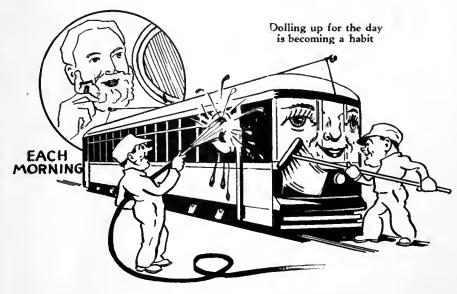
The palm for papers on bus operation goes to R. N. Graham for his excellent presentation before the Metropolitan Section, Society of Automotive Engineers. Close behind Mr. Graham in the importance of the papers presented on this subject came A. J. Brosseau, with his address at the meeting of the Bus Division of the American Automobile Association in Philadelphia; Clark T. McConnell, B. W. Arnold and Mr. Noonan of Pittsburgh.

There was certainly no dearth of good papers at the meetings during the year. It is not extravagant to say that the Cleveland convention was the most fruitful one yet held, but at all the sectional meetings, with possibly one exception, the spirit reflected was the one that is putting the industry back on its feet. President Sawyer traveled the length and breadth of the land, and his remarks at the sectional meetings did much to bring home to his audiences the need for keeping everlastingly at the problem. As Mr. Sawyer repeatedly said, this is a new day, and as Charlie Gordon put it, "You Can't Sell Cotton Goods in a Silk Age." At the Oklahoma meeting Mr. Storrs said the fact that the industry has come back to render the excellent service that it does today proves conclusively the essentiality of it and also the measure of the men engaged in it.

Perhaps no year was more conspicuous than the past for the accomplishments in the development of de luxe equipment. The car of the future will no longer symbolize merely utility but rather utility plus art. Industrial art is fast reaching the plane of the Fine Arts. Witness the Kansas City Public Service Company adopting a color scheme for cars

as submitted by the Municipal Art Commission. Imagine the residents of El Paso some years back gazing upon chrome yellow and Yale blue on their electric railway equipment. This super-decorative idea follows closely the psychology of the new Ford school of thinking, which is conscious of the general change in habits and ways of living and has come to believe that a vehicle that merely takes you there and back has long since outlived its usefulness and now must be replaced by a vehicle that takes you there and brings you back in style. Of course, extremes are to be expected. In that respect some of the cars are like the short skirt. They may be in bad taste, but they often show good form.

And so the trend runs. To recapitulate the record of new cars here there is no need. Suffice it to say that in Atlanta and other cities where car and general rehabilitation programs have been carried out the officers of the companies resorting to these means of keeping abreast of the times have not been disappointed with the amount of recognition such efforts have received at the hands of the regulatory and other public bodies. New equipment saved the Eastern Massachusetts Street Railway \$1,528 per car a year. New equipment is also playing a big part in the comeback of the reorganized



ride in; second, building up in their minds the feeling that their street railway company is trying to provide the public with good facilities, the psychology of which is that when the time comes for you to ask the public to give you more revenue, you will meet with a ready response and a wholesome co-operation rather than the swift kick which has so often been the lot of the poor railway."

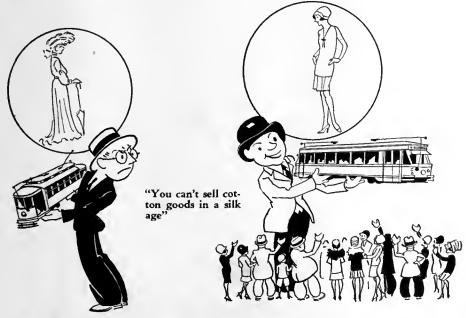
And it isn't so expensive to keep cars up, as Pierre V. C. See of the Northern Ohio Power & Light Company showed in his article "Keeping Cars Attractive at Small Cost" in the JOURNAL for June 11. Pittsburgh led city system who rides his own cars:

I saw a car with clean windows today and when I got back to the office I raised hell to find out who cleaned the windows and spent all that money."

G. W. James, Jr., after a study of the electric railway car situation was moved to poetry in the Convention Daily and epitomized the car situation in the following lines:

Ten old street cars Drawn up in a line Along came the treadle car And then there were nine. Nine bum street cars On the siding wait; Progress said "Streamline" And then there were eight. Eight old street cars, Ought to be in heaven; One fell to pieces And then there were seven. Seven old street cars, One was full of nicks; People wouldn't board it And then there were six. Six bum street cars, Owners not alive; One smashed through faulty brakes And then there were five. Five old street cars, Hard slat seats of yore; "Leather," "Plush" and "Kemi-suede" And then there were four. Four noisy street cars As jumpy as a flea; Along came the "worm drive" And then there were three. Three weighty street cars Always lumbering through; Some one cried "aluminum" And then there were two. Two shoddy street cars Laughed at on the run; Motor fell to pieces
And then there was one. One punk street car, Knew its day was done; Some one yelled "piece of junk" And then there was none.

Now, good transportation with suitable cars presupposes adequate fares. Houston, Buffalo and Atlanta were among the cities that went to a cash 10-cent fare, while Baltimore seeks

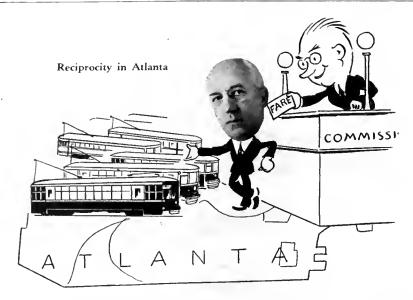


Cincinnati, Hamilton & Railway.

As H. G. Holtzclaw put it:

"We have two primary incentives for improvement—first, to get back some of the business which we have lost, by giving our patrons a clean, comfortable, attractive vehicle to ago by the manager of quite a large

Dayton the way in keeping cars clean and attractive at small cost by putting in automatic electric washing and scrubbing apparatus in its carhouses. All this effort to keep cars presentable is in strange contrast to the remark said to have been made not so long



that rate. The spread of the 10-cent fare idea is illustrated by the fact, noted before, that there are 116 cities of more than 25,000 population in the country with this basic rate.

No Vehicle Superior to Trolley

For moving large numbers of persons the superiority of the electric car remains undisturbed. Thus, a survey of traffic conditions in Chicago, made public in January, 1927, showed that of the 1,693,506 people riding in or out of the central business area 62.4 per cent used the street cars or elevated, 13.1 per cent the steam railroads, 5.3 per cent the buses and 19.2 per cent private automobiles. The details of the story gleaned from the traffic survey in Chicago were contained in several articles in the JOURNAL, the first of which was run in the issue for Jan. 8. The automobiles were responsible for more than seventeen times as many accidents as the street cars. Detroit it was estimated that the annual economic loss through traffic congestion and delay is more than \$30,000,000, and H. M. Gould points out that that city is less than 50 per cent efficient in the use of its streets.

A WISE OLD GENTLEMAN TALKS SAFETY

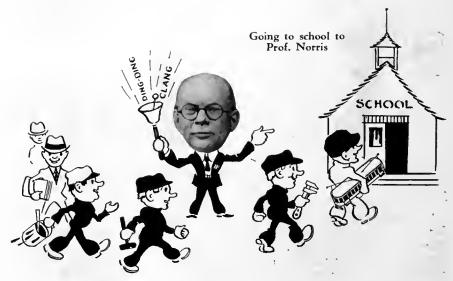
By means of slogans, safety campaigns, prizes and bonuses for noaccident records the men in the railway business and their managements are impressing riders and pedestrians alike with the need of an intelligent and sympathetic understanding of the safety movement. While Aunty Jav Walker was forbidding here and there, Mr. Will Livelong had stopover privileges in Philadelphia for the month of April. Every agency, association and organization listened to this wise gentleman's admonitions on reducing accident hazards in the streets. New Orleans celebrated a 100 per cent safety day and the New York State Railways celebrated the fact that ten employees operated 240,000 miles without an accident. Chester K. Thomas of the Chicago, North Shore & Milwaukee Railroad advocated popularizing safety work. J. H. Handlon suggested studying safety more closely, particularly investigating the accident breeding habits of employees. The Monongahela West Penn Public Service Company decided during the year just ended to devote at least one page of Courtesy and Service, its official publication, to news of safety. In Brooklyn operators with no-accident records were awarded cash considerations as well as watches, and on many other properties there were prizes of one kind or another intended to make employees safety conscious in their daily duties. At all times the idea is to make the safety slogan short in preachment but long in practice.

But after all, safety, like merchandising, depends upon the interest, training and education of employees. Rapid progress is being made in equipping transportation men not only for their jobs but in getting more out of life. Bus operators in Akron, Ohio, are graduated summa cum laude, and 2,300 employees of the Philadelphia Rapid Transit Company enrolled in classes for practical instruction, while their leisure time is often spent among the 6,000 books and 150 periodicals of the company's library.

Education is handled intensively in Boston, where Professor Norris directs a program which includes courses in public speaking, fabric painting, events of the day, law and investing savings. Dr. Rowland, in Milwaukee, likewise is pointing the way to widened opportunity for utility employees through a variety of

self-improvement courses.

After all, no industry can rise above the intelligence of the men who are engaged in it. As they sow, so is the industry of which they are a part. To go back to Mr. Chrysler, let it be said that something is brewing, but it isn't trouble, not at the present pace in the railway industry. All depends, of course, on where the emphasis is placed, like the skipper who wrote in the log, "The mate was drunk today." The mate said, "Is that necessary?" The captain responded, "It's true, isn't it?" "Yes," answered the mate. "Then it stands," replied the captain. Next day it was the mate's turn at the log and he wrote, "The captain was sober today." When the captain saw it he asked, "What did you put that in the record for?" The mate said, "It's true, isn't it?" "Yes," said the captain, "it's true, but—" "Then it stands," replied the mate.



Electric Railway

Costs and Fares in 1927

General commodity prices have dropped slightly during the year, followed by similar reductions in construction costs. Fares and wages show increases

By Albert S. Richey

Electric Railway Engineer, Worcester, Mass.

URING the past several years, in its Financial and Corporate section, ELECTRIC RAILWAY JOUR-NAL has presented each month a series of index numbers compiled by the writer under the heading "Conspectus of Indexes." This conspectus is made up of indexes showing the trend of street railway fares and of the costs of electric railway wages and materials entering into electric railway operation; costs of construction, both electric railway and general; wholesale commodities in general; retail food; cost of living, and some others. In the Annual Statistical Numbers of the Journal, the first issue in January each year beginning in 1923, charts and tables were presented showing the trend since 1913 of the most important of these indexes as affecting electric railway operation. In Fig. 7 herewith is shown a similar chart indicating the trend of five of these indexes from January, 1914, through the latest available figures for 1927. The indexes there shown are: (1) Wholesale prices of all commodities, as computed by the U. S. Bureau of Labor Statistics; (2) Electric Railway Construction Costs, as computed by the formula of the American Electric Railway Association; (3) Electric Railway Operating Materials Costs, including fuel for power; (4) Electric Railway Wages; (5) Street Railway Fares.

INDEX COMPUTED ON SAME BASIS AS IN PREVIOUS YEARS

The methods used in the computation of these five indexes were described fully on page 37 of the Journal for Jan. 2, 1926, in an article which also contained a tabulation showing the numerical values of the various indexes monthly from January, 1920, through December, 1925. The earlier monthly numerical values, from January, 1914, through December, 1919, may be found on page 19 of the Journal for Jan. 5, 1924. A tabulation herewith shows the numerical value of six of the indexes yearly from 1913 through 1927, and monthly beginning with January, 1925, and these six indexes also are shown graphically for the past three years on a somewhat larger scale than in Fig. 7 by the charts Figs. 1 to 6, inclusive.

FARES UP 2 PER CENT

The average street railway fare, as shown by Fig. 1, has increased during 1927 from 7.42 cents to 7.57 cents, an increase of 2 per cent during the year. Twenty-three of the 143 cities which affect this index reported increases in street railway fares during the year. The most impor-

tant of these increases were in Buffalo, Syracuse, Rochester, New Bedford, St. Louis, Atlanta, Fort Worth, Houston and San Antonio. Other changes were of less

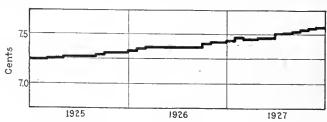


Fig. 1—Street Railway Fares (1913 = 4.8425 cents)

importance as affecting the index, either on account of the smallness of the changes or the relatively small population involved.

WAGES CONTINUE UPWARD TREND

The index of electric railway wages, as shown by Fig. 2. has continued its gradual upward trend which started in 1923. This index showed a slight increase in almost every month of 1927 and now stands at 228.4, with a total gain of not quite 1 per cent since December, 1926. The principal increases in wages of conductors, motormen and car operators have been in Virginia, Baltimore, New York City, Eastern Massachusetts, Indianapolis and Boston. The present index number of 228.4 is comparable with 100 in 1913, the peak of 232 in 1920, and the low point of about 207 in the early part of 1923. The increase in electric railway wages, amounting to

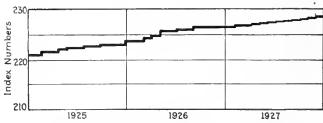


Fig. 2—Electric Railway Wages (1913 = 100)

128.4 per cent since 1913, is still out of all proportion to the increase in cost of living, which according to the National Industrial Conference Board had increased only 64.2 per cent between 1914 and November, 1927. The average index of the cost of living during 1927 being about 164, and the average index of electric railway

wages being about 227, the "real wages" of electric railway trainmen, as compared with 1913 and 1914, may be represented by an index number of 138, which is the index of wages divided by the index of the cost of living. In other words, the average electric railway trainman in the United States now has the opportunity to increase his standard of living 38 per cent over that of 1914. It may be remembered that a similar computation a year ago showed the index of "real wages" of electric railway trainmen as 134, compared with the present index of 138. This indicates an increase in the "real wages," or opportunity to increase the standard of living, of about 3 per cent during the past year. This has been due in part to a slight increase in wages, as before noted, but in a somewhat larger measure, it is due to a decline in living costs during the past year.

MATERIALS COSTS DECREASED

The cost of electric railway operating materials declined somewhat during 1927, as is indicated by the index which is shown for the past three years in Fig. 3. This index, which in December, 1927, stood at 140.6, was then at its lowest since its 1920 peak. It should be borne in mind

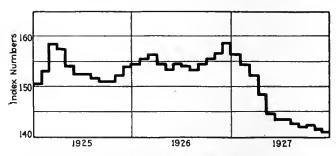


Fig. 3-Electric Railway Operating Materials (1913 = 100)

that in the make-up of this index, fuel for power enters into it with a weighting of 40 per cent. The decline of the index during 1927 was chiefly due to the falling off in fuel prices, although there were some recessions in its other elements.

Construction Costs Off Slightly

Electric railway construction costs showed a fairly steady falling off during 1927, with a slight gain in December, as is shown by Fig. 4. Compared with the average for 1926, 202.6, the index for December, 200.7. was about 1 per cent lower, and the average for 1927, 201.1, was three-quarters per cent lower. One of the principal constituents of this index is the common labor rate, which, according to Engineering News-Record, averaged 56 cents in the early part of the year, had declined to 54½ cents in October, and increased to 55 cents in December. The costs of various materials entering into electric railway construction, except those of steel rails and copper, also showed some decline during the year.

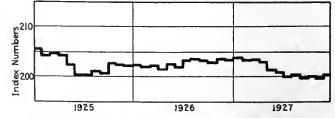


Fig. 4—A.E.R.A. Electric Railway Construction Cost Index (1913 = 100)

General construction costs, as indicated by the Construction Cost Index of Engineering News-Record, shown for the past three years in Fig. 5, showed a decline in 1928 somewhat greater than the Electric Railway Construction Cost Index. The various factors of structural steel, other building materials, and to a lesser extent common labor costs, which combined to bring down the Gen-

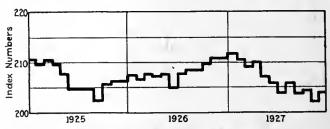


Fig. 5—"Engineering News-Record" Construction Cost Index (1913 = 100)

eral Construction Cost Index during the year, were practically the same as those which caused a similar effect in the Electric Railway Construction Cost Index. The latter, however, is stabilized somewhat by the heavier weighting of steel rail, the price of which has remained constant at \$43 per ton since October, 1922, and also by the very much heavier weighting of the common labor item, which, as has been noted, showed a net decline of less than 2 per cent during the year.

WHOLESALE COMMODITIES DOWN

The Wholesale Commodity Index of the U. S. Bureau of Labor Statistics is shown for the past three years in its revised form in Fig. 6. This index, which previously had been calculated on the base of 1913 = 100, was discontinued on that base in August, 1927, and since then it has been shown as revised to a base of 1926 = 100. The revision also included an increase in the number of commodities included (from 404 to 550), and the adoption of a weighting somewhat different from that previously employed. With these changes, the Bureau of Labor Statistics has published the revised index numbers

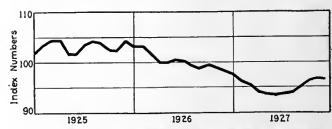


Fig. 6—Index of U. S. Bureau of Labor Statistics Wholesale Commodities (1926 = 100)

beginning with January, 1923, and these are shown in the line marked 1A on Fig. 7. The former series, ending in August, 1927, has been retained as line 1 in Fig. 7 and also in the accompanying tabulation, on account of its value in comparisons back through the years to 1913 and 1914 representing pre-war conditions. The Bureau states that it has in preparation a calculation of the revised index numbers which will carry them back to January, 1913, but until these calculations are made public it will be necessary to use the former series as here presented for such comparisons with years preceding 1923. Because a number of new commodities have been added to the series and others dropped, and the weighting of the various commodities has been changed, it is not possible accurately to join the revised series on to the

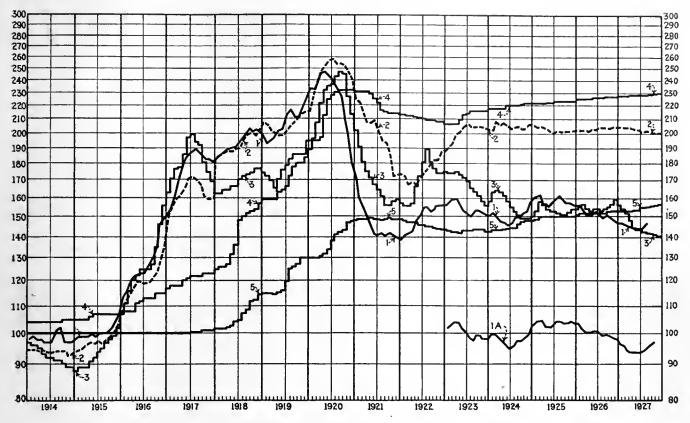


Fig. 7—Trend of Construction Costs, Wages and Fares 1913-1927 (1913 = 100)

1. Wholesale prices all commodities (U. S. Bureau of Labor Statistics).

1A. Wholesale prices all commodities (U. S. Bureau of Labor Statistics revision on base 1926 = 100). See text for comparison with curve 1.

2. Electric railway construction costs (American Electric Railway Association).

3. Electric railway operating materials costs (Richey). Includes fuel for power; weighted according to average use in maintenance and operation.

4. Electric railway wages (Richey). Maximum hourly wages of platform men, weighted according to number of men.

5. Street railway fares (Richey). U. S. cities (except New York); weighted according to population.

	Street Railway Fares (Richey)	Elec. Ry. Operating Materials Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Con- struction Costs (Am. Elec. Ry. Assn.)	General Con- struction Costs (Eng.News- Record)	Wholesale Prices, All Com- modities (U.S. Bur. Lab. Stat.)		Street Railway Fares (Richey)	Elec. Ry. Operating Materiala Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Con- struction Costs (Am. Elec. Ry. Assn.)	General Con- struction Costs (Eng.News Record)	Wholesale Prices, All Com- modities - (U.S. Bur. Lab. Stat.)
1913 aver 1914 aver 1915 aver 1916 aver 1917 aver 1918 aver 1920 aver 1921 aver 1922 aver 1923 aver 1924 aver 1925 aver 1925 aver 1927 aver	100.0 100.0 100.1 100.1 100.5 106.2 120.7 137.2 148.9 146.0 142.9 149.2 150.2 152.2	100.0 92.6 93.5 126.2 181.9 168.8 172.2 224.6 169.9 170.0 168.0 156.0 153.1 155.0	100.0 104.2 106.2 111.6 120.6 140.5 174.0 217.3 222.7 210.0 212.1 219.2 222.2 225.3 227.5	100.0 94.0 97.3 119.8 162.7 192.5 205.1 244.7 200.7 175.2 200.7 175.2 200.4 202.4 202.4	100.0 88.6 92.6 129.6 181.2 198.4 251.3 201.8 174.4 214.1 206.7 206.2	100. 0 98. 1 100. 8 126. 8 177. 2 194. 3 206. 4 226. 2 146. 9 148. 8 153. 7 149. 7 158. 7	1926 Jenuary February March April May July August September October November December	151.8 151.9 151.9 151.9 152.1 152.0 152.0	154. 3 155. 3 156. 4 154. 2 153. 1 154. 4 154. 1 153. 1 154. 2 155. 4 159. 2	223.8 224.1 224.7 225.4 225.5 225.7 225.7 226.1 226.3 226.3	202. 2 201. 9 202. 0 201. 3 202. 4 201. 9 203. 2 203. 6 203. 2 202. 9 203. 7 203. 2	207. 1 206. 5 207. 6 207. 0 207. 3 204. 8 207. 8 208. 3 208. 3 209. 8 210. 8	156. 0 155. 0 151. 5 151. 7 152. 3 150. 7 149. 2 150. 5 149. 7 148. 1 147. 2
January February March April May June July August September October November	149. 6 149. 6 149. 9 150. 0 150. 0 150. 2 150. 3 150. 6 151. 0 150. 7	150. 3 153. 1 158. 4 157. 3 153. 9 152. 6 151. 6 150. 9 152. 0 153. 9	221.0 221.0 221.5 221.6 222.2 222.4 222.5 222.6 222.7 222.8 222.8 223.0	205. 3 203. 9 204. 4 204. 1 202. 0 200. 0 200. 1 201. 0 202. 7 202. 7 202. 4	210. 4 209. 7 210. 2 209. 5 207. 2 204. 6 204. 6 202. 1 205. 3 205. 9	160. 0 160. 6 161. 0 156. 2 155. 2 157. 4 159. 9 160. 4 159. 7 157. 6 157. 7	January February March April May June July September October November	153.8 153.4 153.4 153.6 153.6 155.2	156.0 154.0 152.1 148.0 144.2 143.0 142.9 142.1 141.6 141.8 141.3	226.6 226.7 226.7 226.9 227.4 227.5 227.8 227.9 228.0 228.2 228.3 228.4	203 . 5 202 . 9 203 . 0 202 . 6 201 . 6 200 . 6 199 . 9 200 . 9 199 . 4 199 . 8 199 . 4 200 . 7	211.5 210.2 208.8 209.0 206.8 203.7 205.5 203.6 204.4 202.0 203.9	146. 9 146. 4 145. 3 144. 2 144. 1 143. 7 144. 6 146. 6 (Base changed after August)

old by the application of a multiplying factor. From January, 1923, to December, 1925, and from January through August, 1927, during which periods both the old and new index numbers are available, the relation between the two seems to be about 1.53. The old series index number for the year 1926, however, was 151, and

as the new series is on the base of 1926 = 100, this would indicate a relation of 1.51 between the two series. This indicates that an attempt to extend the old series forward or the new series backward by the use of a simple multiplier is likely to result in an error in the nature of 1 or 2 per cent.

Receiverships Reduced in 1927

With the exception of one year, the mileage of companies going into the courts was less than in any year since 1916. Many properties have been returned to their owners

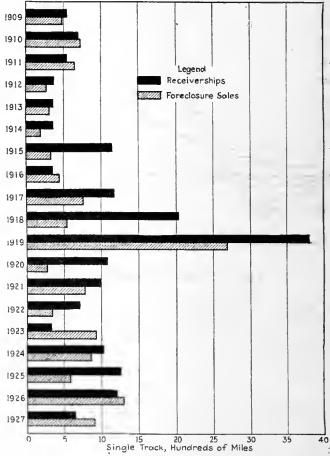
REATER stability of the industry than for a number of years is indicated from a study of the receivership record for 1927. For the first time since 1923 not one company of major importance was thrown into the courts. Only two companies with more than 100 miles of track were included in the list of new receiverships. These were the Chicago, South Bend & Northern Indiana Railway and the Des Moines City

Table I—Electric Railway Receiverships—1927

	writes or			
	Single	Outsta	anding Seco	urities
	Track			Receivers'
	Involved	Stock	Bonds	Certificates
Murphysboro & Southern Illinois				
Electric n.R., Murphysboro, Ill		400.000	2,269,550	None
Chicago, South Bend & Northern		.00,000	w,wo,,,,,	210110
Indiana Ry., South Bend, Ind		\$7,500,000	\$4,955,500	None
		47,200,000	41,733,300	Mone
Evansville & Ohio Valley Ry.		511,985	1,960,900	None
Evansville, Ind	70.00	211,902	1,900,900	.vone
Des Moines City Ry., Des Moines,		2 010 100	4 9 3 1 0 0 0	37
Iowa		3,019,100	4,821,000	None
Union Traction Co., Coffeyville,				
Kan	85.00	700,000	1,150,000	
Grandview R.R., St. Louis, Mo		(a)	(a)	(a)
Hannibal Railway & Electric Co.,				
Hannibal, Mo	6.50	111,165	102,500	None
Eighth & Ninth Avenues Ry., New				
York, N. Y	37.27	232,000*	None	None
Empire State R.R., Syracuse, N. Y.,	70.00	2.950.000	2,750,000	None
Cincinnati, Georgetown & Ports-				
mouth R.R., Cincinnati, Ohio		1,500,000	1,000,000	None
Lawton Railway & Light Co.,		.,,,,,,,,,,	.,,	
Lawton, Okla		100,000	100,000	None
Pennsylvania & Maryland Street		100,000	100,000	LVOIRE
	7.00	190,800	216,000	None
Ry., Meyersdale, Pa.				
Schuylkill Ry., Girardville, Pa	34.00	400,000	1,550,000	None
T-1.14 1025	(24.22	17 (15 050	20.075.450	
Total for 1927	044.32	17,010,000	20,075,450	None
* 58,000 shares. No par value. Ba	ised on m	arket quotati	ion,	
(a) Information not available.				

Railway. Contrasted with this, the United Railways of St. Louis, with more than 450 miles of track, was able to have its affairs straightened out and be discharged from the custody of the courts.

Mileage of electric railways in receivership on Jan. 1. 1928, showed a decrease of almost 13 per cent under



Miles of track of roads going into receivership during 1927 were about half as many as in 1926

Jan. 1, 1927. Seventeen companies, comprising 1,099 miles of track, emerged from receivership during the year. Thirteen companies, involving 624 miles of track,

Table II—Record of Electric Railway Receiverships

Year	Number of Companies	Miles of Single Track Involved	Outstanding Stocks	Securities———————————————————————————————————
1909	22	558.00	\$29,962,200	\$22,325,000
1910	11	696.61	12,629,400	75,490,735
1911	19	518.90	29,533,450	38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342,84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152,10	40,298,050	39,372,375
1916	15	359.26	14,476,600	10,849,200
1917	21	1,177.32	33,918,725	33,778,400
1918	29	2,017.61	92,130,388	163, 257, 102
1919	48	3,781.12	321,259,354	312,915,104
1920	19	1,065.31	28,758,455	72,283,575
1921	19	986.42	32,909,525	36,177,800
1922	14	695.43	18,140,150	20,304,400
1923	12	333,63	8,332,100	14,707,066
1924	12	1,021.88	28,489,700	35,716,000
1925	14	1,260.07	51,383,195	54,696,525
1926	16	1,228.28	17,769,435	117,560,073
1927	13	624.32	17,615.050	20,875,450

Table III—Record of Electric Railway Foreclosure Sales

		Miles of	——— Outst	anding Securi	ties
	Number of	Track			Receivers'
Year	Companies	lavolved	Stocks	Bonds	Certificates
1909	21	488.00	\$22,265,700	\$21,174,000	· (a)
1910	22	724.36	19,106,613	26,374,075	(a) -
1911	25	660,72	91,354,800	115,092,750	(a)
1912	18	267.18	14,197,300	10.685,250	(a)
1913	17	302, 28	15,243,700	19.094.500	(a)
1914	11	181.26	26,239,700	44,094,241	(a)
1915	19	308.31	30,508,817	16,759,997	(a)
1916	19	430.14	13,895,400	22,702,300	(a)
1917	26	745,19	27,281,900	27,313,045	(a)
1918	23	524,22	37,740,325	20,149,384	(a)
1919	29	2,675.48	89,893,400	79,836,738	\$42,300
1920	13	259.90	7,782,400	11,227,328	52,000
1921	13	777.97	33,642,255	30,863,526	5,000
1922	13	322.88	7,491,500	12,640,600	114,683
1923	15	927.45	118,077,959	110,638,250	12,265,000
1924	14	869.25	21,022,800	34,845,535	3,440,388
1925	13	569.39	18,074,300	18,329,555	53,000
1926	28	1,291,17	20,054,700	57,340,363	214,000
1927	16	940.68	53,345,000	78,445,100	3,140,000
(a)	Data not ava				

Table IV—Electric Railway Receiverships as of Dec. 31, 1927

	•				•
DISTRICT OF COLUMBIA Washington-Virginia Ry. (1)	Year o Receive ship . 1923		e Capital k Stock	\mathbf{Debt}	Receivers' Certificates None
ILLINOIS Chicago & Interurban Traction Co., Chicago (2 Chicago Railways, Chicago	1922	50.00 597.00	1,000,00	0 1,816,000	None None
INDIANA		25, 28	3 1,000,00		None
Chicago, South Bend & Northern Indiana Ry. South Bend. Evansville & Ohio Valley Ry., Evansville. Indianapolie & Cincinnati Traction Co.	. 1927 . 1927	125.00 70 .00			None None
Indianapolia (4)	. 1925 . 1924	101.00 445.50			\$156,000 None
IOWA Dea Moines City Ry., Dea Moines Mississippi Valley Electric Co., Iowa City	1927 1926	103, 24 6, 00		0 4,821,000 184,500	None None
KANSAS Juplin & Pittshurg Ry., Pittsburg Union Traction Co., Coffeyville	1924 1927	94.52 85.00	7,000,000	3,078,500 1,500,000	None None
KENTUCKY Owenshoro City R.R., Owensboro	. 1923	12.50	75,000	400,000	None
MASSACHUSETTS Milford, Attleboro & Woonsocket Street Ry. Springfield (5). Milford & Uxbridge Street Ry., Milford	1024	29.73 35.00			None None
MICHIGAN Detroit United Ry., Detroit	1925	613.89	15,375,000	29,745,500	None
Grand Rapids. Grand Rapids. Houghton County Traction Co., Houghton. Michigan Railroad Co., Jackson.	1926	44.09 32.15 156.71	957,200	660,000	None None None
MINNESOTA Minneapolis, Anoka & Cuyuna Range Ry., Minneapolis (6) St. Paul Southern Electric Ry., Hastinga Wahpeton-Breckenridge St. Ry., Breckenridge.	1926 1918 1925	29.25 17.54 1.00	300,000 658,225 42,500	284,000 364,900 None	None 12,150 None
MISSOURI Hannibal Railway & Electric Co., Hannibal	1927	6.50			None
Kansas City, Lawrence & Topeka R.R., Kansas City (2) Southwest Missouri R.R., Webb City		12.00 90.00	•	400,000	None .
MONTANA .				. ,	None
Helena Light & Railway Co., Helena (7) NEW JERSEY	1925	18.50	935,000	878,000	None
Morris County Traction Co., Morristown (1) NEW YORK	1923	68,98	300,000	4,179,000	25,000
Bingbamton Ry., Bingbamton (4). Brooklyn Heights R.R., Brooklyn Buffalo & Lackawanna Traction Co., Buffalo Eighth & Ninth Avenues Ry., New York. Empire State Railroad Corp., Syracuse. Geneva, Seneca Falla & Auburo R.R., Genava. Hamburg Ry., Buffalo. Ithaea Traction Corp., Ithaea. Manhattan & Queens Traction Corp., Long	1925 1919 1918 1927 1927 1926 1920	47.72 5.10 8.80 37.27 70.00 12.00 21.72 12.72	978,895 200,000 55,000 232,000 2,950,000 157,100 None 400,000	2,807,200 250,000 1,000,000 * None 2,750,000 507,000 750,000 763,000	None None None None None 27,000 25,000
New York & Oneens County Ry Jackson	1917	21.66	20,000	None	None
Heighta Ogdensburg Street Ry., Ogdensburg. Olean, Bradford & Salamanca Ry., Olean (8) Penn Yan & Lake Shore Ry., Penn Yan. Second Avenue R.R., New York (1) Staten Island Midland Ry., Brooklyn. Steinway Ry., New York Westchester Street R.R., New York (1)	1923 1922 1926 1918 1908 1920 1922 1920	35.07 7.74 100.00 8.50 23.96 28.68 31.11 16.32	3,235,000 150,000 3,808,000 94,000 1,862,000 1,000,000 None 700,000	1,300,000 150,060 472,818 100,000 5,682,000 1,000,000 1,500,000 168,000	None None None None 3,140,000 3,000 None None
OHIO Cincinnati, Lawrenceburg & Aurora Electric					
Street R.R., Cincinnati Indiana, Columbus & Eastern Traction Co., Springfield	1913 1921	31.67 153.23	808,900 4,025,000	750,000 7,900,000	None 65,000
OKLAHOMA Lawton Railway & Light Co., Lawton	1927	6.31	100,000	100,000	None
Tulsa Street Ry., Tulsa	1925	23.00	580,000	771,000	None
Schuylkill Ry., Girardville Pennsylvania & Maryland St. Ry., Meyersdale (4)	1927 1927	34.00 7.00	400,000 190,800	1,550,000 216,000	None
UTAH Salt Lake & Utah R.R., Salt Lake City	1925	96.71	5,043,700	2,611,292	100,000
Net receiverships Dec. 31, 1927 (51 cos.) (1) Sold at foreclosure.		3,750,73	\$95,951,705	\$230,814,865	3,553.150

Sold at foreclosure and operations discontinued.

Property now operated by Peoria Terminal Co. Receiver not yet discharged.

Foreclosure pending.
Property liquidated. Receiver not yet discharged.

Sold at foreclosure in 1926.

Operations discontinued December 31.

Property being dismantled.

were placed in the receiver's hands, which is almost 50 per cent reduction from last year. Fifty-one companies, with 3,750 miles of track, are now in receivership, compared with 55 companies, with 4,307 miles of track, on Jan. 1, 1927, or a reduction of four companies and 557 miles of track.

In the amount of securities involved, the record for the year shows an encouraging situation. The total of fixed obligations of the companies entering receivership during the year was \$20,875,450 and the total of stocks and bonds of all descriptions was \$38,490,500. This contrasts with 1926, when \$117,560,073 of fixed indebtedness and \$135,329,508 of total capitalizations were forced to seek protection of the courts. The total reduction in 1927 in securities involved amounts to \$96,071,446, or slightly more than $22\frac{1}{2}$ per cent.

After many months of negotiations a new franchise agreement was reached in St. Louis. The St. Louis Public Service Company took over the properties of the United Railways and the Missouri Electric Railroad and the eight-year receivership of the two latter companies was terminated. The new company was organized in 1926 to buy the properties, but foreclosure sale was not effected until 1927.

The United Railways of St. Louis was the largest city property in receivership, with the exception of the Chicago Railways, which is not involved in financial difficulties. The expiration of the Chicago Railways franchise, as explained in the Statistical Number of Jan. 1, 1927, caused it to go into receivership as a protection to its bondholders. The railway is still operating on short-term extensions of two or three months, while negotiations are going on and legislation is being introduced to solve the problem of street railway operation in Chicago.

Three properties at Rockford, Ill., comprising more than 100 miles of track, sold at foreclosure in 1926, completed their reorganization in 1927 and are now being operated as the Rockford Public Service Company and the Elgin, Belvidere & Rockford Railway.

Receivers of the Oklahoma Railway, Oklahoma City, Okla., were dismissed on Dec. 16 and the properties turned over to the new owners, who immediately announced that rearrangement of the financial structure was under way.

In July service was suspended on the Kansas City, Lawrence & Topeka

Table V-Receiverships Terminated and Foreclosure Sales During 1927

Receivers Discharged With or Without Foreclosure Sales or Following Abandonment	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver Certificate	
Denver & Interurban R.R., Denver, Col	. 45.63	\$101,500	\$1,079,000	None	Sold at foreclosure, entire property dismantled and bus service substituted under the name of Deaver & Interurhan Motor Company.
Hartford & Springfield Street Ry., Warehouse Point, Conn. Murphysboro & Southern Illinois Electric R.R., Murphysboro, Ill Rockford, Beloit & Janesville Ry., Rockford, Ill	. 11.00	785,000 (b) (a)	961,000 (b) 907,000	(b)	Property liquidated. Sold at foreclosure sale for scrap.
Rockford City Traction Co., Rockford, III. Rockford & Interurban Ry., Rockford, III.	. 36,17	(a) 4,000,000	(a) 2,175,000	None	Reorganized and receiver discharged.
Kansas City, Kaw Valley & Western Ry., Bonner Springs, Kan	. 42.31	250,000	1,000,000		Sold at foreclosure sale and reorganized as the Kansas City, Kaw Valley Railroad.
Boston & Worcester Street Ry., Framingham, Mass		2,482,200	2,520,000		Sold at foreclosure to the Boston, Worcester & New York Street Ry.
Mesaba Ry., Virginia, Minn	. 15.00	2,260,000 (b)	1,581,000 (b)	(b)	Property dismantled and receiver discharged. Sold at foreclosure and property dismantled.
Missouri Electric R.R., St. Lnuis, Mo	. 436.32	1,000,000 41,296,000	700,000 52,590,000	None (Sold at foreclosure sals and reorganized as the St. Louis Public Service Co.
Portsmouth, Dover & York Street Ry., Portsmouth, N. H			707,000		Receiver discharged. Property sold and dismantled in 1926.
Long Island Electric Ry., Jackson Heights, N. Y		600,000	600,000		Receiver discharged. Property operated by Jamaica Central Railways, Inc.
Ciacinnati, Georgetown & Portsmouth R.R., Cincinnati, Ohio Sharon & New Castle Street Ry., Youngstown, Ohio Oslahoma Ry., Oklahoma City, Okla	. 17.00	1,500,000 120,000 5,595,900	1,000,000 120,000 5,815,000	None	Reorganized and receivership terminated. Sold at receivers' sale for scrap. Receivership terminated.
Total of receiverships terminated (17 cos.)	1,098.82	\$51,990,600	\$71,755,000	\$30,000	,
Sold at Foreclosu	re Sale I	But Receive	Not Yet	Discharge	ed
Washington-Virginia Ry., Washingtou, D. C	40.00	2,378,300	5,614,000	None	Sold at foreclosure sale. Property now operated as the Mt. Vernon, Alexandria & Washington Railway and the Arlington & Fairfax Railway.
Chlcago & Interurban Traction Co., Chicago, Ill	50.00 12.00	1,000,000 250,000	1,816,000 400,000	None None	Property sold and operation discontinued. Sold at foreclosure sale. Operations suspended July 16, but negotiations now under way for resumption of service.
Morris County Traction Co., Morristown, N. J	68.98	300,000	4,179,000	None	Sold at foreclosure to Public Service Transportation Co.
Second Avenue R.R., New York, N. Y	23.96	1,862,000	5,682,000	3,140,000	Sold at foreclosure sale. Reorganisation plan now pending before New York Transit Com-
Total of foreclosure sales without discharge of receivers (5 coa.).	194.94	\$5,790,300	\$17,691,000	\$3,140,000	mission.
Foreclosu	res With	out Receive	rships in 19	927	
Auburn & Syracuse Electric R.R., Auburn, N. Y. Port Arthur Traction Co., Port Arthur, Texas. Batavia Traction Co., Batavia, N. Y. Willamette Valley Southero R.R., Oregon City, Ore.	7.00 2.50	1,962,000 333,000 10,000	1,742,000 323,000 14,100 666,000		Operations abandoned.
Total forclosures, without receiverships (4 cos.)	74.51	\$2,305,000	\$2,745,100		

Electric Railroad, Kansas City, Mo., following a receivership of eight years. The property was sold at foreclosure sale in August for junk. Residents along the route were so anxious to have operation resumed that the purchaser agreed to defer dismantling the tracks until they had an opportunity to make arrangements for operating the line. Negotiations are still under way to accomplish this, and it is hoped that operation will be resumed early this year.

The Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan., was sold at foreclosure and reorganized as the Kansas City, Kaw Valley Railroad. Interest charges have been reduced from \$82,470 to

\$30,000 a year through the reorganization.

Foreclosure of the Second Avenue Railroad, New York City, occurred early in 1927 and the reorganization plan is now before the New York Transit Commission for approval, the receivership being expected to end early in 1928.

Three railways included in Table I, New Receiverships, are also shown in Table V, Terminations. These are the Cincinnati, Georgetown & Portsmouth Railroad, Cincinnati, Ohio; the Grandview Railway, St. Louis, Mo., and the Murphysboro & Southern Illinois Electric Railroad, Murphysboro, Ill. Of these, the two latter companies terminated their receiverships after foreclosure sale and dismantling of the properties. Termination of the receivership of the Cincinnati, Georgetown & Portsmouth Railroad was effected through reorganization after a receivership of less than six months.

Three other properties were sold and dismantled, the Denver & Interurban Railroad, Denver, Col.; the Mesaba Railway, Virginia, Minn., and the Sharon & New Castle Street Railway, Youngstown, Ohio. In the case of the Denver & Interurban Railroad, bus service was substituted under the name of the Denver & Interurban Motor Company. Although the Portsmouth, Dover & York Street Railway, Portsmouth, N. H., was sold and dismantled in 1926, the receiver was not discharged until 1927.

The property of the Washington-Virginia Railway, Washington, D. C., was sold at foreclosure and purchased by two companies organized to take it over, the Mount Vernon, Alexandria & Washington Railway and the Arlington & Fairfax Railway. These companies are operating the property under one management and dismissal of the receiver is looked for early this year.

The Westchester Street Railroad was sold to the Third Avenue Railway in 1926 and is now being operated by that company. To all practical purposes the receivership is over, but the actual dismissal of the receiver has not taken place, so the figures are still carried in Table IV.

Control of the Hannibal Railway & Electric Company, Hannibal, Mo., was purchased last winter by owners of the Hannibal Transportation Company, operating buslines in and out of Hannibal. A voluntary petition in bankruptcy was filed in October, 1927, to dispose of the indebtedness taken over and a receiver was appointed.

The Morris County Traction Company, Morristown, N. J., was purchased at foreclosure sale by the Public Service Transportation Company, bus subsidiary of the Public Service Railway, Newark, N. J.

At the close of 1927 only three large companies re-

At the close of 1927 only three large companies remained in receivership, the Chicago Railways, with 597 miles of track; the Union Traction Company of Indiana, 445 miles, and the Detroit United Railways, 614 miles.

ManufacturersReflectConfidence for 1928

Continuation of good times seen in opinions of industrial leaders and reports of 100 industrial business and engineering editors. Manufacturers close to electric railway industry look on new year with confidence

OUND business conditions for the country in 1928 are reflected in the opinions of leaders of industry in the retail, utilities, manufacturing and other fields. These coincide with the forecasts of some of the leaders in finance, civic and trade organizations. In pre-visioning stability for 1928 some among them have based their beliefs on the present abundance of credit at low rates, volume of farm purchasing power resulting from improved agricultural conditions during 1927, low inventories and other controlling factors.

While in the offing looms up the shadow of a presidential campaign and the possibility that the coming campaign may tend to have an upsetting influence on business conditions, yet this does not appear to be viewed with any decided apprehension. The feeling evidently is one of confidence in the stability of the country's general eco-

nomic position.

In connection with the views just quoted on credit and the presidential election, it is interesting to note what James S. Alexander, chairman of the board of directors National Bank of Commerce in New York, said at the annual meeting of shareholders on Jan. 10:

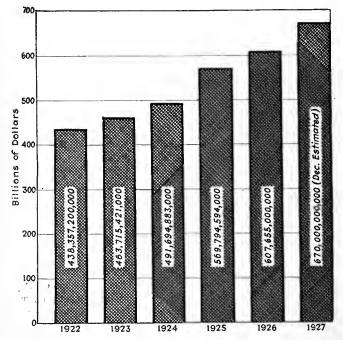
While easy money alone is not sufficient to assure prosperity, it is a great help toward it, and it was unquestionably an important factor in business throughout 1927. The maintenance of the comparatively low rates which prevailed has been assisted by the open-market operations of the Federal Reserve Bank and the very moderate demands of commercial and industrial borrowers for funds. Present indications seem to point, not to cheaper money, but to fairly stable moderate rates, a condition highly favorable to good, sound business.

The record for many years back discloses no definite connection between presidential elections and the course of business. Some presidential years have been prosperous; some, periods of depressions, and some mixed. While the approach of the election will probably be reflected in a little more caution than might otherwise be in evidence, there is not much likelihood of the development of any seriously disturbing issue and we can foresee no justification for business nervousness because of politics.

Further indication of a continuation of prosperity in 1928 is found in a composite summary of year-end reports made to the National Conference of Business Paper Editors and the Associated Business Papers, Inc., by 100 editors of industrial, business and engineering publications.

BUSINESS EDITORS REVIEW PROSPECTS

Business in the United States reaches the close of 1927 in a sound condition and faces 1928 with every prospect of continued prosperity and of definite gains in certain basic industries, according to the above summary. The forecast also indicates that the buying power of the

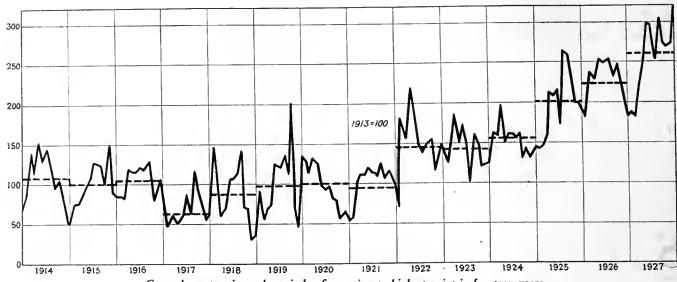


Bank debits to individual accounts, as reported by Federal Reserve Bank, reflect stability and prosperity of country

American farmer will increase during the present year and forsees continuance of wages at their present levels in the basic industries.

Outstanding in the policies of industry which will continue through 1928 are scientific determination of markets in line with intensive effort to reduce selling costs, and further widespread replacement of obsolete and inefficient machinery. The editors report at the year's closing a lack of excessive inventories, except in a few specialties where markets have been overestimated. Price trends indicate that levels will be about the same as they were in 1927, with some trades just now showing a softening in prices. Reduction in size and intensive development of jobbing areas is seen. No indications of slump are found on the nation's business horizon.

In reviewing 1927, the summary shows that indexes of trade which measure week-to-week activities, such as electric power used, output of pig iron and steel ingots, building construction and freight loadings, are slightly under those of 1926. Power used in 1927 increased 7 per cent over the previous year. Pig iron totaled 36,300,000 tons, putting 1927 in eighth place among big years. Steel ingot output was about 8 per cent less for 1927 than in 1926, making 1927 fifth among years of largest output.



General construction volume index figure rises to highest point in fourteen years

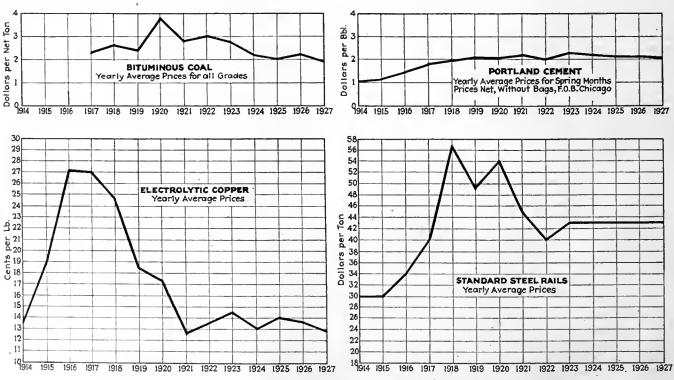
Volume of railroad freight declined, especially in the latter part of 1927, but in common with other trades there is expectation of an increase in freight in 1928. The volume of water-borne freight was slightly greater in 1927 than in 1926, and tonnage rates held steady.

Building construction is reported lower, due to reduction of residential building, with industrial construction and certain classes of public works building very much increased. Heavy engineering construction is 11 per cent higher, industrial construction is $2\frac{1}{2}$ per cent higher, electric light and power plant construction about 5 per cent over 1926, with an estimated additional 5 per cent increase in 1928.

High specialization in machinery to reduce production costs marked several basic industries. In the cotton and rayon division of the textile industries, plants have been brought up to very high efficiency. Steel averaged 75 per cent of capacity in 1927 against 83 per cent in

1926, and pig iron capacity 73 per cent in 1927 against 80 per cent in 1926. In metal working lines the average of working operations was about 15 per cent less than in 1926. Nineteen hundred twenty-eight is expected to equal 1927. Railway equipment was used to greater efficiency in 1927. In the furniture trades there was about 90 per cent use of equipment.

The total payrolls in practically all industries were less in 1927 than in 1926. The notable exception was in the field of transportation. Railroad payrolls advanced about \$60,000,000. Prices throughout 1927 are reported as slightly lower and the margin of profit less, but the outlook for 1928 is generally considered favorable, with some slight price increases. Pig iron prices during 1927 averaged 10 per cent less than in 1926 and steel prices were 4 or 5 per cent less. The profits of steel companies for the first nine months were from 15 to 20 per cent less than for the similar period in 1926.



Downward trend in price levels of three out of four basic industries. Others remain constant

In general, the close of 1927 finds the industries of the United States with stocks which deviate little from the volume at the close of 1926, reflecting continued hand-to-mouth buying. In the oil field the total stocks of crude and refined products increased about 12 per cent during this year. In the paint industry they are generally considered low. Iron and steel stocks are considerably lower than they were a year ago and the unfilled orders of the steel companies are from 12 to 15 per cent below those of the close of 1926. Crude rubber stocks are ample to offset any upward price movement. Volume of coal trade was less in 1927 than in 1926 and stock of coal on hand is greater.

In the chart of four basic industries accompanying this article, the 1927 yearly average prices for bituminous coal (all grades), Portland cement and electrolytic copper moved down, and that for standard steel rails remained the same as for 1926. This lack of any drastic change in prices indicates a reasonable steadiness of supply and demand and reflects a normalcy in basic

manufacturing and transportation industries.

One of the elements which helps to make a composite gage to determine the stability of the country's business is the yearly total of bank debits to individual accounts, as reported by the Federal Reserve Bank. The accompanying chart shows this figure over a period of years. The figure for December, 1927, is not given by the Reserve Bank but has been estimated on the basis of December, 1926.

LIGHT AND POWER INDUSTRY

In reviewing 1927 it is of interest to observe in the Jan. 7, 1928, issue of *Electrical World* that in 1927 the light and power industry used more than 37,000,000 tons of coal and that each year for several years the consumption of coal has increased at the rate of about 1,000,000 tons a year. Electrical manufacturers of heavy equip-

ment did a gross business of about \$1,000,000,000. In the same publication an article, "Light and Power Progress," by G. F. Wittig, statistical editor, furnishes the following information:

The year 1927 has witnessed a normal growth and development in the light and power industry. Its operations continue to expand, its service continues to supply an increasing demand and its management continues to develop better ways of doing business.

The 4,400 operating properties supply electricity to 21,700,000 customers in the United States. For this service they receive a gross revenue of \$1,783,000,000. Operating and maintenance expenses used \$767,000,000 of the revenue, taxes to local, state and national governments accounted for a sum estimated to be \$150,000,000, and the balance of the revenue took care of incidentals, development expense, depreciation and obsolescence, and the credit requirements of an industry group whose operating and holding company capitalization aggregates \$9,500,000,000. In 1927 the light and power utilities raised more than \$2,100,000,000 in the money markets which they used for refunding high-rate issues and for additions to service facilities. Of this sum, \$240,000,000 was raised by direct sales of securities to customers and employees in 344,000 individual sales. The capital expenditures for these properties aggregated \$760,000,000 in 1927, and the budget for 1928 amounts to \$900,000,000.

the budget for 1928 amounts to \$900,000,000.

In their normal operations the light and power companies generated 75,100,000,000 kw.-hr., of which 29,000,000,000 kw.-hr. came from waterpower plants and 46,100,000,000 kw.-hr. from fuel-burning stations. The generating capacity of the industry aggregates 29,000,000 kva.; of the prime movers water power operates 11,700,000 hp. This power supplied nearly 16,000,000 of the 35,800,000 hp. driving our factories, to quote 1925 census figures, and it gave to the cities and homes the services and con-

veniences which only electricity can render.

ELECTRIC RAILWAY MANUFACTURERS TAKE CONFIDENT VIEW

In order to obtain an idea of the prospects of the electric railway industry in 1928, as determined by its purchases, the Journal has queried executives of representative manufacturing companies in close contact with its needs and developments. The outlook is pretty generally viewed with optimism and confidence, as will be noted in the following opinions:

General Electric Company

DURING 1927, the electrical manufacturing business in general has been satisfactory, with approximately the same volume as in 1926. We look for additional activity during 1928 as most of the utility companies have already completed their financing and the total budget of expenditures for 1928 exceeds materially that of 1927.

We feel that economic conditions are sound and that the transportation companies will show added activities which will require additional electrical equipment for buses, street cars and locomotives.

J. G. BARRY,
Vice-President,

Westinghouse Electric & Manufacturing Company

RAILWAY equipment business for 1927 has not measured up to what was anticipated at the begining of the year. The equipment business booked has been less than for the year 1926, whereas at the beginning of 1927 it was anticipated that this business would exceed that of 1926.

The association program looking toward more extensive modernization of cars has not as yet accomplished the full results hoped for in the actual replacement of obsolete equipment. It has, however, inspired a great deal of development on the part of the manufacturer and a great deal of interest on the part of the industry in new designs and new types of drive, which are now available. Having devoted the year largely to an intensive study and trial of the many new developments, the industry should now he in a position to decide what is best and enter upon a real program of purchasing new equipment in 1928.

Electric railway business must keep pace with the growth, the development and the expansion of our cities. The year 1928 will, undoubtedly, see a considerable increase in the purchase of automobiles, which will cause even greater congestion in the business districts than at present. The result will be favorable to the electric railways in that the car riding will be increased. Increased riding must be stimulated by more up-to-date and attractive equipment and this will result also in reduced operating expenses.

The gas-electric bus has a place, distinctly its own, in street railway transportation and there will undoubtedly be a gradual increase in the number of these equipments placed in service by electric railway companies.

While the railway equipment business

in 1928 will not show a phenomenal increase over the year just closed, it is believed that the study and development of the past year should result in an increase in business, as compared with 1927, of about 25 per cent.

A. J. MANSON, Manager Traction Apparatus.

The J. G. Brill Company

THE year 1927, just passed, was one of the poorest in the history of car building. While car builders during the year contributed more in the way of equipment development than during previous years, the comparatively few purchases must not be construed as indicating a lack of appreciation on the part of the operating companies of the importance of improvements made. most cases the value of present equipment represents a large percentage of the entire valuation upon which fare rates are based. The economic advantages of modern types of equipment are, therefore, placed beyond the reach of many electric railway companies due to inability to disturb the present arrangement.

Careful analysis of the situation on various properties reveals in many cases particular conditions involving franchises, paving regulations, etc., beyond the control of the railway, which hinder the modernization program.

Equipment design has progressed. The improvements are here, and the industry through the agency of the trade press is familiar with what has been accomplished. Whether 1928 will witness any change in the situation depends principally upon electric railways obtaining relief from the particular conditions which have hindered the introduction of modern cars.

SAMUEL M. CURWEN,

The Cincinnati Car Company

THE surest way to forecast trade conditions is to take a retrospective view of the growth of this great country. We find it has prospered from the beginning, and its growth has been linked at every stage with developments

in transportation.

Electric railways have contributed their share to this prosperity; and while the motor bus and private automobile are supplying a part of today's increased demand for transportation, established railway lines are still the safest and cheapest means of urban travel, and will continue to dominate the field. The year 1928 promises increasing activities on the part of operating and manufacturing companies to meet the demand for more comfortable and faster mov-H. L. SANDERS, ing cars. President.

Haskelite Manufacturing Corporation

OUR business in 1927 was slightly less than in 1926, but not to the same extent that the purchase of new cars decreased. This year we look for a greatly increased business as a result of our development efforts during the past few years. The riding public is demanding strong lightweight cars of greatly improved appearance. The satisfying of this demand means increased sales for us. The introduction of a 40-passenger single-deck bus will stimulate operators to improve their rolling stock. We are very optimistic for 1928.

JAMES R. FITZPATRICK, Vice-President and Secretary.

Bridgeport Brass Company

OUR business with the transportation companies during 1927 was not equal to that of 1926. This, no doubt, was due to conditions throughout the country which seemed quite general and resulted in less business in most in-

We do feel that there are indications that 1928 will show a considerable improvement, and we are quite optimistic in regard to the outlook.

A. D. Guion, Advertising Manager.

Ohio Brass Company

IT has become recognized in the electric railway industry that successful transportation is not only a matter of improving service but of improving the methods of selling that service and the orgnization back of it. In this connection there has been a trend toward better equipment, track and overhead. From this progression, in 1927, our company has experienced a good volume of business with O-B products for car, track and overhead. Likewise, it is anticipated that this continued interest and activity of railway men will result in an increased business in 1928.

E. F. WICKWIRE,

A.C.F. Motors Company

I N OUR opinion, motor coach transportation made considerable progress in 1927 despite the fact that coach manufacturers generally sold fewer coaches than in previous years. There was, we believe, a more careful selection of the types of vehicles purchased and a marked improvement in the methods, application and operation of motor coaches by the electric railway companies generally.

We believe that more coaches will be sold in 1928 than in 1927, and we naturally believe that the tendency is toward the purchase of heavy-duty vehicles. There is a decided trend toward the purchase of the very best equipment possible, regardless of its price.

We look for the retirement of a considerable number of light-duty coaches bought during the years of 1923 and 1924 which are no longer able to furnish the type of transportation demanded by the American public. These will undoubtedly be replaced to a certain extent by heavy-duty vehicles, both of the standard urban coach and of the de luxe urban coach types. In order to increase the ratio of passenger-miles, we anticipate the establishment of many highspeed, high-fare motor coach lines in city and suburban service, designed to appeal to the habitual coach rider morning and evening and to the present-day automobilist during the off-peak hours.

We feel that all motor coach manufacturers have made considerable progress in design and construction during 1927 and that this will result in improved motor coach transportation as the newer types and models of motor coaches are put into service by the

electric railways in 1928. C. S. SALE, President.

Twin Coach Company

OUR analysis of hus operation throughout the United States indicates that 1928 should be a banner year from bus sales standpoint for two reasons. First, the introduction of singledeck coaches of larger carrying capacity is and will continue to open up entirely new fields for the economic operation of

motor coaches. Second, many of the larger transportation companies will have a rather large number of coaches that will be completely written off and replacement equipment will be purchased, whereas 1927 saw very little replacement equipment purchased.

F. R. FAGEOL,

President.

The White Company

BUSINESS prospects for 1928 in the motor truck and bus industry indicate a much better year than 1927 turned out to be. Most manufacturers have studied and analyzed general conditions as reflected in business reports from all parts of the country, have sized up the readings of the so-called "barometers" of business and agreed in the prediction that the new year will be one of greater volume and prosperity-possibly the biggest year in the history of the automotive industry.

The year now closing has been one not only of severe competition, small margins of profit and dull business in certain localities, but a year of readjustment. New tendencies in highway transportation have dictated new developments in motor vehicles for hauling of both passengers and freight, as well as revamping of manufacturers' lines to a certain extent. Most of this work has been accomplished, and we look forward eagerly to 1928 as a year of renewed activity in selling.

So far as The White Company is concerned, we are ready to meet the conditions of the new year. This growing tendency toward lighter and more flexible units has necessitated production changes. New White models of light delivery and fast express trucks, introduced during 1927, are in full production now. This is true also of the new White six-cylinder, 100-hp. bus. The latter part of the year has witnessed the cleaning up of repossessions and other unavoidable obstacles. The new year finds our company with a balance sheet showing an exceptionally strong financial position, with a complete line to meet the new demands of motor transportation in all its commercial phases, and with every confidence that 1928 is to be a good year.

WALTER C. WHITE,

Metal & Thermit Corporation

WE ARE very optimistic for the electric railway business for 1928. During 1927 our business with street railways increased more than 40 per cent over 1926, and we are looking forward to a similar increase in 1928.

While there is still some doubt by the railway operators in the future of the industry, which we think is un-warranted, there is a general tendency toward optimism which has led most companies to seek out the best and most permanent methods of doing their

work. It is interesting to know that practically all the railways that have taken an optimistic view of the future and have made concerted efforts to give the public what it wants in the way of modern transportation, are making their operation a success.

It is to be hoped that 1928 will see a larger percentage of the railways in this class. John T. Tinnon, Manager Rail Welding Department.

Consolidated Car-Heating Company

EQUIPMENT orders from trans-portation companies were somewhat disappointing during a part of 1927. Toward the end of the year conditions materially improved, and we look with confidence into the year 1928.

CORNELL S. HAWLEY, President and Treasurer.

National Pneumatic Company

IN 1927, it seems to us, transporta-tion has come much closer to its goal, not only keeping pace but catching up with the demands of constantly increasing traffic. Facilities have been extended. Equipment has been added to or adapted to meet new demands with greater efficiency and at a lower operating cost.

Co-ordination has brought various branches of service into closer relationship and affiliation. This results in broader and better service to the public. We look for a continuation of, and even an acceleration of, this tendency in 1928, with increased patronage and reduced expense for all modern and progressive transportation agencies.

T. W. CASEY, Vice-President.

SKF Industries

THE year 1927 was from our observations one in which the transportation companies showed a disposition to give serious thought to matters of maintenance and the general improvement of the efficiency of their service.

While the volume of business done by us with them was not large, it was satisfactory in character. From present appearances it is our judgment that the year 1928 should show a substantial improvement in volume over that of S. B. TAYLOR, General Sales Manager. last year.

The Tool Steel Gear & Pinion Company

OUR railway gear sales in 1927 were about 5 per cent better than in 1926. Our export gear business showed a similar improvement. Approximately one-sixth of our total sales was in new equipment, i.e., where our gears were

specified on new motors for new cars. This class of business showed a decided improvement over 1926 and has been increasing from year to year for the last few years.

We look for a much greater improvement, especially in the new equipment field, during 1928. It has been evident of late that the electric railway industry is coming back and that the method is to be snappy service with modern equipment. We feel the next few years will show a decided improvement in purchases for rehabilitation, and that the industry will buy the best equipment it can get. It will look to ultimate operating economies and good will on the part of its patrons to bring electric railways back to the place they deserve.

E. S. SAWTELLE, Assistant General Manager.

Portland Cement Association

THE street car companies are emerging from the period of adjustment made necessary by conditions brought about by bus and automobile transportation. They are meeting this competition with better service, better equipment and better track.

The engineering departments of the street railway companies are giving more attention than formerly to the development of standard designs of car track construction and particularly to that portion of the track structure that must transfer the loads to the soil.

While exact data are not available, it appears that the use of a definite rigid foundation to support car tracks is gaining favor and that more of the so-called "rigid" type was constructed in 1927 than in any previous year.

The outlook for car track reconstruction rehabilitation in 1928 is promising. The extent of it will, of course, depend in a large measure on the money available for such work.

A. C. IRWIN, Manager Railways Bureau.

Ohmer Fare Register Company

HE business of the Ohmer Fare Register Company in the past twelve months showed a marked degree of progress and expansion, and in fact 1927 was the best year in our history.

The progressive transportation manager is less inclined than ever before to depend on guesswork in the operation of his system, but requires a method that will insure an accurate and dependable record of the income derived from each day's operation. The Ohmer system of fare registration was therefore in great demand in 1927.

With the realization of transportation managers generally of the importance of protecting income at its source and furnishing statistical data concerning the operation which is of vital importance, the demand for our products

increases proportionately, and our opportunities for 1928 give great promise of a record year.

JOHN F. OHMER, President.

Hevwood-Wakefield Company

CONSIDER the outlook for the sale of seats to transportation companies during 1928 to be excellent, especially in the line of bus seats. During 1927 we had a banner year in our car seat department. We are looking forward to even better business during BERTRAM BERRY,

Manager of Sales, Car Seat Department.

Westinghouse Air Brake Company

WE ARE entering the year 1928 with a decided feeling of optimism for business in general and particularly so for the transportation and allied industries.

General conditions throughout this country are fundamentally sound and most lines of business are now striking the stride that indicates an active and prosperous year.

As relates to the transportation industry, it is obvious that the high degree of efficiency with which it is being operated (both steam and electric) has brought about a return of confidence as

indicated by the large purchases of rolling stock during the past 60 days. The substantial improvements that have been made and are continuing in

the electric railway industry, contributing to the comfort and convenience of the public, has brought about an appreciation on the part of the public that their interests are best served by upholding and supporting the service and, with the extension of the improvements and with proper co-ordination of electric car and bus service, the industry as a whole should enjoy a very pros-perous year. S. G. Down, Vice-President.

Globe Ticket Company

DESPITE a temporary wave of false economy, which brought price into undue prominence in some quarters during 1927, the year was one of great advancement for us in the transportation field.

Progressive properties are showing a quickened interest in fare control methods which are safe, efficient and genuinely economical from every standpoint. Among other favorable indications, two of the largest transfer users in the United States invited our suggestions, abandoned their old concepts and placed their business with us.

Electric railway properties in 1927 definitely started on the return swing of their prosperity pendulum.

P. C. Snow, Vice-President.



Program Complete for C.E.R.A. Meeting

THE final program for the Called Railway Association meet-THE final program for the Central ing at Cincinnati, Ohio, has been completed. Following is the schedule of events:

THURSDAY, JAN. 26, 1928

9:30 A.M.—Address of Welcome, Hon. Murrray Seasongood, Mayor of Cincinnati. Ohio.

Address of the President, M. Ackerman, manager Peoples Railway, Dayton, Ohio. "Relationship of Freight Traffic to Revenue," by F. D. Norviel, general passenger and freight agent Union Traction Company

of Indiana.
"The Situation in Cincinnati," by W. A. Draper, president Cincinnati Street Rail-

12:30 P.M.—Adjournment for lunch.

2:00 P.M.-Motor coach tour of the city of Cincinnati and inspection of the shops of the Cincinnati Street Railway.

6:30 P.M.—Association dinner. Address, Judge Roland W. Baggott, Dayton, Ohio.

Dance.

Friday, Jan. 27, 1928

9:30 A.M.—"The Cincinnati Plan," by Edgar Dow Gilman, Director of Public

Utilities city of Cincinnati.
"Publicity," by J. E. Morton, secretary Ohio Bankers Association, Columbus, Ohio.
"Advertising Transportation. How Much

of It Is Science? How Much of It Is Bunk?" by E. T. Gundlach, Gundlach Advertising Company, Chicago, Ill.

General business. Election of officers.

International Street Railway Convention at Rome

PUBLICATION of the preliminary program for the Rome meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, has just been made by the secretary of the association from association headquarters in Brussels, Belgium. It is as follows:

Sunday, May 6-Registration, issue of final program, meeting of the executive committee.

Monday. May 7, 9:30 a.m.—Reception and opening session to be held in the Campidoglio building (Capitol); afternoon, technical session; theater party in the

Tuesday, May 8, 9 a.m.—Technical session; 2 p.m., a sightseeing tour; 5 p.m., visit to the Campidoglio; 8:30 p.m., banquet offered by the Municipal Tramways of Rome.

Wednesday, May 9, 9 a.m.—Technical session; 1 to 2 p.m., departure by special train for Naples; 5:30 p.m., arrival at Naples and sightseeing trip; 9:30 p.m., reception by the municipal authorities of Naples at the Palais Royal.

Thursday, May 10, 9 a.m.—Trip to Pom-

Thursday, May 10, 9 a.m.—Trip to Pompeii and return to Rome by special train in

the evening.

Friday, May 11, 9 a.m.—Technical session; 2:30 p.m., excursion to the environs of Rome.

Saturday, May 12, 9 a.m.—Technical session; 3 p.m., inspection visit to the offices and carhouses of the Rome Tramways; 8 p.m., complimentary banquet offered by the National Facisist Transportation Association of Italy.

Sunday, May 13, 9 a.m.—Technical session, business meeting and adjournment; 2:30 p.m., sightseeing tour; 8:30 p.m., departure for Turin.

Monday, May 14, 9 a.m.— Arrival at

COMING MEETINGS

Electric Railway and Allied Associations

Jan. 16-17-Midwest Electric Railway Association, Arlington Hotel, Hot Springs, Ark.

Jan. 18-19-Kentucky Association of Public Utilities, annual meeting Brown Hotel, Louisville, Ky.

Jan. 18-19-Central Electric Traffic Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 25—Central Electric Railway Master Mechanics' Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 25-26-American Railway Association, Motor Transport Division, organization meeting, Palmer House, Chicago, Ill.

Jan. 25-27-Electric Railway Association of Equipment Men, Southern Properties, Roosevelt Hotel, New

Jan. 26-27-Central Electric Railway Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 31-New York Electric Railway Association, annual meeting, Hotel Commodore, New York, N. Y.

Feb. 13-17-American Institute of Electrical Engineers, winter convention, New York, N. Y.

Feb. 17-18-Central Electric Railway Accountants' Association, Hotel Gibson, Cincinnati, Ohio.

May 2-5-Southwestern Public Service Association, Dallas, Texas.

May 6-12-Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, annual meeting, Rome, Italy.

June 6-8-Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

July 8-12-Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention, Cleveland, Ohio.

Turin; 11 a.m., reception at Porta Nuova for a visit to the exposition and luncheon offered by the Municipal Tramways of Turin; afternoon, visit to the exposition

Tuesday, May 16—Visit to the exposition and the city; evening, theater party.

Tuesday, May 16—Visit to the offices and shops of the Fiat Automobile Company; excursion to the environs of Turin, and luncheon offered by the Società Ferro-

Tramviarie; evening, departure for Milan. Wednesday, May 16—Visit to the Milan Exposition in the morning; trip around the city in the afternoon; and dinner offered by the Milan municipal authorities in the evening.

Thursday, May 17-Excursion to the Italian Lakes.

Details Arranged for C.E.R. Master Mechanics Association

HE program for the meeting of I the Central Electric Railway Master Mechanics Association is as follows:

Wednesday, Jan. 25, 1928

9:30 A.M.—Address of the president, George R. Green, general superintendent Chicago, South Bend & Northern Indiana

Railway.
"Variable Load Brake," by J. S. Y.
Fralich, Westinghouse Traction Brake

Company.

Discussion.
"W-N Drive and High-Speed Traction Motors," by W. J. Clardy, Westinghouse Electric & Manufacturing Company.

Discussion. "Slide Rule and Calipers" (luncheon talk), by E. H. Arnott, Central Service Bureau.

'Railway Roller Bearings," by M. S. Downes, Timken Roller Bearing Company. Discussion.

Reports of committees. Round-table—General discussion. Election and installation of officers.

Adjournment. 8:30 P.M.—Meeting of executive committee of Central Electric Railway Association.

Toronto Selected for Canadian Meeting

TORONTO has been selected as the location for the 1928 convention of the Canadian Electric Railway Association. The dates are June 6, 7 and 8. As in previous years there will be an exhibit of electric railway supplies.

Southern and Southwestern Equipment Men to Meet Jointly

NVITATIONS have been sent out for the thirteenth semi-annual meeting of the Electric Railway Association of Equipment Men, Southern Properties, to be held in New Orleans, La., at the Roosevelt Hotel, Jan. 25-27. This will be a joint meeting with the mechanical division of the Southwestern Public Service Association.

News of the Industry

Ten-Cent Cash Fare Suggested in Dallas

Officers of the Dallas Railway & Terminal Company, Dallas, Tex., filed with the Mayor and Board of Commissioners of the city on Jan. 9 an application for an increased fare, in which they set forth fully the conditions which make such fare necessary.

Feeling that the patrons of the company, and the citizens of Dallas generally, are directly interested, the application was made available to the public in full.

The proposed schedule of fares recognizes the fairness and justice of charging a ticket rate substantially less than the cash fare rate, thereby providing service to the regular and habitual rider at a rate less than that charged to the transient or casual rider. A statement by the company says:

The company is desirous that the citizens of Dallas, and particularly its patrons, acquaint themselves with the conditions which made this application necessary, and accordingly it extends to every citizen an invitation to request such additional information on the subject as may be desired, as it feels that a lack of mutual understanding will be responsible for whatever difference of opinion may exist.

In its plea the company "respectfully requests that your honorable body establish such new schedules of rates as will accrue in the reserves of the company amounts sufficient to enable it to make the necessary repairs as they accrue; to replace its property when and as it becomes exhausted, inadequate or obsolete; and at the same time to maintain said reserves at normal, as contemplated by its franchise."

The rates suggested tentatively are a 10-cent cash fare for adults, with five tickets for 35 cents; students' tickets at 4 cents and children five to twelve years old at 4 cents.

Third Arbitrator Wanted in Chicago

Following a series of wage conferences between Guy A. Richardson, vice-president, representing the Chicago Surface Lines, Chicago, Ill., and Alderman Oscar Nelson, representing the trainmen's union, announcement was made on Jan. 10 that the two men were unable to agree and would immediately begin considering the selection of a third man.

Under the terms of the arbitration agreement signed Messrs. Richardson and Nelson were to proceed to consider the terms of an arbitration of the demands of the union for a wage increase of 15 cents and for life and sick benefit insurance, as well as the suggestion of

the company for a decrease of 5 cents in the present wage scale. Upon agreement they would have been authorized to extend the agreement to June 1, 1930.

In the case of disagreement, however, they were to proceed at once to select a third man to complete the board of arhitration, and in this event any agreement reached would cover only the present fiscal period ending June 1, next.

Experimental Rates in Santa Barbara

Following a study of the Santa Barbara & Suburban Railway increased rate case the California Railroad Commission found on Jan. 3 that the situation calls for a trial of experimental rates to determine whether or not any fare structure could be devised which will make it possible to continue the service. The company was directed to file within five days the following schedule of fares for its

rail and bus system: Single cash fare to the holder of an identification card, 5 cents; individual weekly identification card, 25 cents; individual identification card for a longer period than one week, at the fare of 25 cents a week or such lesser fare as the company may fix; single cash fare, 10 cents.

In ordering the experimental rates which will provide a 5-cent fare to the holder of a weekly identification card costing 25 cents, the commission said that the consensus of opinion was in favor of first trying a 10-cent fare with a 25-cent weekly identification card or pass entitling the holder to a 5-cent fare.

According to the commission, the argument in favor of this form is that the regular rider, depending upon the number of times he rides, may enjoy a fare approximating the one now in effect. This plan has the added advantage of doing away with the multi-coin fare which slowed up traffic and irritated the rider.

Chaos Again in Columbia

Approximately 60,000 people are without dependable transportation system. City Council favors return of street car.

Jitneys running sans schedule and sans route

AN EMERGENCY state in the transportation muddle in Columbia, capital of South Carolina, was reached recently when the buses of the Carolina Transit Company, 21 all told, were sent to Charlotte, N. C., where they were put in storage, leaving the Columbia field to the unregulated jitneys. A year ago Columbia offered a choice of three modes of transportation to its citizens—one could ride on street cars, buses or jitneys-the fares amounting to about 10 cents in each instance. Now only one system remains, that of the jitneys, which have no definite schedule, operate over no definite route and are withdrawn from the streets at the pleasure and whim of the owners. These vehicles are owned by individ-

The many incidents in Columbia's transportation muddle, becoming more complex since last March, when the Columbia Railway, Gas & Electric Company stopped the operations of its street cars on the ground of lack of patronage, have been reviewed from time to time in these pages. December, 1927, the Carolina Transit Company and a bus manufacturing company made a proposition to the Columbia City Council to operate the street cars in conjunction with the buses. The Council, feeling that the Broad River Power Company, which has the franchises for furnishing light, power and gas to the city, should also operate the street cars, looked with disapproval on the proposition.

Late in December a representative of the bus manufacturing company went to Columbia, sales of "token" used in lieu of fares were stopped, employees were released and on the last night of the year of 1927, a few minutes after midnight, the buses, in a long caravan, left the city for Charlotte. Columbians awoke on the dawn of the New Year with no system of public transportation other than that furnished by the jitneys. The proposition made to the Council for the operation of buses in conjunction with street cars was withdrawn.

Last summer the Council passed an ordinance regulating the jitneys, prescribing routes and schedules for them. The jitney union at once instituted legal proceedings to have the ordinance declared unconstitutional, and the case was taken to the State Supreme Court, where it now rests.

The City Council has taken the position that street cars offer the best and most satisfactory system of transportation and it is now considering passing another ordinance having to do with transportation, an ordinance separate and independent from that now before the Supreme Court. Its intention is to force the Broad River Power Company to run the street cars.

Decision in Labor Injunction

New York court returns case with sugges-tion of possible modification of sweeping terms

THE New York Court of Appending on Jan. 10 suggested possible modi-THE New York Court of Appeals fication of the injunction issued by the New York Special Term in the case of the Interborough Rapid Transit Company, New York City, against Edward P. Lavin, Harry Bark, Joseph G. Phelan and James F. Walsh, restraining them from interfering with the emplovees of the Interborough and inducing them to join an association of railway employees secretly. The court held that an injunction for some part of the relief prayed for is justified by the record and sent the case back to the Special Term "in order that it may exercise its discretion as to whether an injunction of more limited scope should be issued."

EXTRACTS FROM COURT OPINION

After discussing the contractual relations of employee and employer Judge Lehman wrote:

Where employees have freedom of choice a labor union may not be accused of malicious interference when it urges the employees to make that choice in its favor; even though the choice may involve termination of present employment and consequent disruption of a business organiza-

The defendants have the right to induce the plaintiff's employees to join the Amalgamated Association, though that may involve termination of their employment. They are under no obligation to the plaintiff to inform it that some of the plaintiff's employees are joining the union, so that the plaintiff may exercise its choice of retaining or discharging the new members.

Though we have decided that the defendants may not be enjoined from inducement by lawful means to leave the service of the plaintiff or to join an organization of employees other than the brotherhood or to make demands upon the plaintiff for increased wages, yet even such purposes may not be effected by unlawful means.

The defendants may not without the permission of the plaintiff enter upon plaintiff's property or place any signs thereon for the purpose of inducing even lawful action on the part of the employees. The defendants may not achieve their purpose by malicious falsehood and deceit. may not use force or intimidation.

Though the court at Special Term would have been justified in issuing an injunction against any threatened use of unlawful means, even to achieve lawful end, and though we leave open the question of whether the defendants may be enjoined from inducing the plaintiff's employees to conceal from the plaintiff that they had joined the Amalgamated Association, the injunction, as issued, was beyond the power of the court.

Under these circumstances the orders should be reversed and the motion remitted to the Special Term in order that it may exercise its discretion as to whether an injunction of more limited scope should be issued upon the facts contained in this

After the strike of Interborough emplovees in 1916 a voluntary unincorporated association was formed under the name of the Brotherhood of Interborough Rapid Transit Company Em-

ployees. Substantially all 14,000 employees of the company joined the brotherhood. In 1926 the defendants were members of the General Committee of the brotherhood. On July 1, 1926, a group of the employees by a vote of 579 to 7 rejected a proposal that the wages and working conditions should remain unchanged.

The following day the men, through Lavin, demanded an increase in pay. On July 6 a strike started, lasting until July 30. The four individuals named by the company were leaders in the strike movement. It was charged they sought to have the men join the Amal-

gamated Association.

The Interborough then brought this action to secure an injunction which would in effect prohibit the defendants Lavin and others from inducing Interborough employees by lawful or unlawful means to leave the company's employ. An injunction in its broadest

terms was granted.

Nathan D. Perlman of counsel for the Amalgamated Association said on Jan. 10 that the decision of the Court of Appeals was in the first injunction action brought by the Interborough Rapid Transit Company to prevent unionization of its employees, but added that he believed it would have an effect on the decision in the company's second injunction action, which will be argued before Supreme Court Justice Isidore Wasservogel on Jan. 23.

Ford Studies Transportation of Its Men

Following studies conducted at the River Rouge plant of the Ford Motor Company to determine the best method of providing for the transportation of 45,000 men moving in and out of the plant three times a day it has been decided that the best method will be to provide loading and unloading facilities on the company's property so that cars and buses can handle employees. The problem involves a movement of this large number of employees within a period of approximately a half hour,

Parking in Chicago Restricted

The elimination of parking in the Loop district of Chicago, Ill., became effective Jan. 10. Parking is forbidden on weekdays between 7 a.m. and 6:30 p.m. in the entire congested area of the central business district. During these hours passenger motor cars are permitted to stop at curbs only long enough to discharge and receive passengers. Taxicabs are permitted to park only at authorized cab stands, and only the authorized number of cabs are permitted in these stands. Delivery trucks are permitted to use the curb space for not more than one-half hour for loading and unloading purposes. A fine of \$1 to \$25 for each offense is provided by the ordinance. The ordinance is not in effect on Sundays and holidays, and on Saturdays parking is permitted after 3 p.m.

Bus Operators an Issue in Pennsylvania Strike

Insistence of trainmen to have the word "subsidiary" inserted in a wage agreement resulted in a strike on Jan. 6 on the lines of the East Penn Railway between Tamaqua and Mauch Chunk, Pa. The word "subsidiary" would cover buses, which are to be used as feeders for the railway lines and under it the bus drivers would be required to become members of the union.

Weekly Pass Replaces Permit Card at Halifax

The Board of Commissioners of Pub lic Utilities for Nova Scotia has approved the application of the Nova Scotia Tramways & Power Company, Ltd., to change from a 5-cent permit card to an unlimited ride, transferable weekly pass. The permit card was adopted by the former management on June 1, 1924, on the occasion of going from 7 cents cash and seventeen tickets for \$1 to 10 cents cash and six tickets for 50 cents. Permits were sold at the rate of \$1 a month for all hours and 50 cents a month for specified off-peak The permits were also sold at diminishing rates throughout the month. so that an all-hour permit cost only 60 cents after the fourteenth day of the month, while an off-peak permit was then obtainable for 30 cents.

From March, 1925, the company sold the 83-cent tickets at three for 25 cents and during 1926 it added a thirteen-rides-for-\$1 ticket book. The new schedule calls for an unlimited-ride weekly pass for \$1.25 and a ticket rate

of fourteen for \$1 in book form.

Zone Limits at Wilkes-Barre Approved

The Public Service Commission has refused in an order to force the Wilkes-Barre Railway, Wilkes-Barre, Pa., to revise its rate schedule on the branch between Wilkes-Barre and Sugar Notch Borough. The borough filed a complaint with the commission in Harrisburg alleging that the service maintained was inadequate and that the fare charged was unjust.

In its decision the commission dismissed the allegation on the inadequacy of service without much discussion. The section between Sugar Notch and Wilkes-Barre city is divided into two fare zones, with an average length of 2.98 miles each. Other zones on the line the commission found in its study to be approximately the same length.

The commission said it was obvious that zones on a railway system could not all be the same length. The zoning system on the Wilkes-Barre railway lines has been in effect for many years and the commission said it found nothing to indicate that the zones on the lines are unjustly discriminatory or an abuse of managerial discretion.

New Fares in Effect in Council Bluffs

All cars of the Omaha & Council Bluffs Street Railway, operating in Council Bluffs, Iowa, left the carhouse on Dec. 31 with prominent placards announcing a new 10-cent fare effective The 10-cent fare decision was at once. referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 10. The new rates are as follows:

	Cash	Ticket
Council Bluffs, local-adult	10c	6 for 40o
Council Bluffs, local-child	5c	10 for 35c
Omaha-Council Bluffs	10c	10c
Omaha-Council Bluffs-com- mutation.		30 for \$2.25
Council Bluffs-Iowa School for the Deaf—adult	10c	Round trip 15e
Council Bluffs-Iowa School for the Deaf—child		Round trip 10c
Omaha-Iowa School for the Deaf—adult		Round trip 25e
Omaha-Iowa School for the Deaf—child	٠.	Round trip 15c

In the Jan. 1 issue of Street Car Topics, published by the Omaha & Council Bluffs Street Railway, an explanation is made by the company for the necessity for an increase in fare. It was the conclusion of the company that it was best to establish the same rates in Council Bluffs as are in effect in Omaha.

W. Winans Freeman Wins McGraw Award

Electrical men paid tribute to W. Winans Freeman Jan. 10 at a dinner given at the Hotel Roosevelt, New York, on the occasion of the presentation of the James H. McGraw Award medal for co-operation. Prominent executives numbering 300 from Eastern points and as far west as Chicago, gathered to express the approval of the industry of the outstanding service rendered by Mr. Freeman in accom-plishing the reorganization of the Society for Electrical Development, by which its directorate has been made officially representative of the major national associations of the industry. It was in recognition of this that the medal was awarded.

P. G. Gossler, president of the Columbia Gas & Electric Company, paid a personal tribute to Mr. Freeman, and Owen D. Young, chairman of the General Electric Company, eulogized the practical ideal which is the basis of the McGraw Award, the recognition of the service of individuals in the advancement of the industry.

In responding, Mr. Freeman dwelt upon the promise of broadened opportunity now opened to the electrical industry through the closer unity that has been effected between the national associations. He modestly insisted that the credit for the accomplishment should go to his associates on the directorate of the society and to the staff.

Mr. Freeman was selected for the award by judges representing the four branches of the industry—J. E. Montague, S. L. Nicholson, G. E. Cullinan and James R. Strong.

Mr. Freeman is chairman of the Union Gas & Electric Company of Cincinnati, vice-president of the Columbia Gas & Electric Company, New York, and for eight years has been president of the Society for Electrical Develop-

Seattle Will Not Borrow from Peter to Pay Paul

By a vote of five to one, a group of City Councilmen who attended a conference called by Mayor Bertha K. Landes of Seattle, Wash., disapproved of a plan to loan funds of the city Light Department to the Municipal Railway, to permit cashing about \$121,000 in payroll warrants to be issued on Jan. 10. The Light Department has approximately \$400,000 derived recently on a bond sale, lying in banks at 2 per cent, and the plan was to loan that to the Railway Department at the 5 per cent the payroll warrants will bear until paid. Councilmen took the stand that it would be "foolish to make one utility carry another.'

The plan to effect a loan from the city light funds to aid the Municipal Railway in meeting a payment of more than \$1,000,000 due next March on the purchase of the railway from its private owners developed controversy among members of the City Council.

A resolution adopted by the Clearing House Association last year declaring against all warrants is still standing, but individual members of the association have stated they will take the payroll warrants.

A group of representative Seattle business men and real estate operators appeared before the utilities committee of the City Council recently protested again the Council acting favorably on two propositions under consideration for providing aid for the municipal railway from the general fund. The committee had before it two bills, both of which were drawn up to place them on the ballot at the city election on March The bills, prepared by Councilman
 L. Blaine and Oliver T. Erickson, are alike with the exception of a 5-cent fare proposal contained in Mr. Erickson's measure. Both measures provide a limit of 3 mills in the tax levy for railway aid. According to estimated valuations for next year, the levy would yield between \$800,000 and \$900,000 for the railway.

Mr. Erickson stated that his measure was offered as first aid, and not a solution, for the serious problem in which the railway finds itself. He said:

Anything the citizens' committee would recommend could not be put in effect for two years. If the present situation continues, we might as well take the cars off.

At a meeting in the Rainier Valley District, business men of that section went on record as strongly opposing any attempt to return to 5-cent fare on the municipal railway, pointing out that it was impossible for the Seattle & Rainier Valley Railway to reduce its fares.

Plan Petition to Governor for Chicago Traction Session

Circulation of a petition asking Gov. Len Small to convene a second special session of the state Legislature for the purpose of granting the city of Chicago the necessary enabling legislation to clear up the long-pending local transportation problem is proposed in a call for a meeting of the City Council committee on local transportation on Jan. 16, recently issued by Chairman Joseph B. McDonough. If the plan is approved, Alderman McDonough declared, a canvass will be started at once to obtain 100,000 signatures among the civic, business and labor organizations of the city.

While the merits of this procedure were being discussed by city officials, rumors began to filter in from Springfield that the Governor, of his own accord, may still decide to summon another special legislative session to deal with the Chicago traction program. He failed to include traction in the business of the current special session which

convened Jan. 10.

At the Jan. 16 meeting Alderman Mc-Donough expects the five transit bills embodying the needed legislation to be presented in final form. Following a meeting with company representatives early last month, the bills were handed back to the city attorney and a sub-committee for certain minor changes.

Membership of Legislative Committees Announced in New York

John M. Hackett, Poughkeepsie, again heads the public service committee of the Assembly, in the appointments handed down by Speaker Joseph A. McGinnies of the Assembly on Jan. 9. To this committee is referred all bills relating to public utilities and amendments to the public service commission law. Other members of the committee include Catchpole of Ontario, Pammenter of Monroe, Grenthal of New York, Stephens of Putnam, Munsel of Clinton, a new man succeeding Winters of Schuyler, who did not return to the Assembly; Fisher of Lewis, Dickey of Erie and Condon of Westchester, a new member succeeding Emerson of Jefferson, who did not return, Republicans, and Gillen of Kings, Ryan of Queens, Higgins of New York, succeeding Hayes of Albany, and Falk of New York, succeeding Dineen of New York, Democrats.

The Senate committee on public service remains the same as last year. The members include Warren T. Thayer of Chateaugay, chairman; Campbell of Lockport, Whitley of Rochester, Hickey of Buffalo, J. F. Williams of Troy, Pitcher of Watertown, Brereton of Essex County, Gates of Chittenango and Majority Leader John Knight of Arcade, Republicans, and Twomey of Brooklyn, Dunnigan of New York, Farrell of Brooklyn and Minority Leader of the Senate Bernard Downing, Demo-

Lengthening of Local I.R.T. Stations Ordered

An order directing the Interborough Rapid Transit Company, New York, N. Y., to begin work on the lengthening of four local station platforms was announced by the Transit Commission on Jan. 1. These stations are Canal Street, Spring Street, Bleecker Street and Astor Place on the Lexington-Fourth Avenue Line. In this order the commission states that the lengthening of local platforms has become necessary in order to afford adequate transportation. The order marks a new step toward carrying out the commission's order directing the lengthening of all the Interborough local station platforms to a size sufficient for the accommodation of ten-car trains.

Methuselah Lived 969 Years

A pale yellow car lettered in green and red is used effectively as a safety car by the Jamaica Public Service Company in Kingston, Jamaica. An open car, at one time a familiar sight, is the first of its kind to be run on the streets of the island city. Spectators read with interest on the part just above the side step: "It is everybody's business to be careful" and on the letterboard "Methuselah was a careful man and he lived 969 years." The company on its regular trams also displays various accident prevention cards and slogans.

North Shore Line Freight Business Up 25 Per Cent

With the tonnage for the month of December estimated, the freight and merchandise dispatch traffic over the Chicago, North Shore & Milwaukee Railroad totaled about 825,000 tons in 1927 or an increase of 170,000 tons over 1926. This gain is due to the freight facilities afforded by the new Skokie Valley route, which has convenient connections with steam railroads for the interchange of cars.

Prior to the opening of the Skokie Valley route in 1926, the North Shore Line was unable to handle carload freight south of Highland Park because of franchise restrictions in the various nunicipalities through which it operates. The new high-speed double-track line, however, is constructed on privately owned right-of-way for its entire length. Since the opening of this route, fifteen large concerns dealing in coal, lumber and building materials have located their yards adjacent to its tracks and building operations have flourished.

Another improvement on the North Shore Line has been the development of door-to-door freight service between Chicago and Milwaukee. This service has proved popular with shippers of l.c.l. freight and has made for economy and efficiency in the handling of shipments. Merchandise is placed in steel



Some of the buses in the parade in Newark on the day bonuses were awarded operators of the Essex Division

containers and sealed at points of shipment. The containers, which are semisteel trailers of 8-ton capacity, are hauled to the freight receiving station by tractors and there mounted on flat cars without removing the trailer wheels. On arrival at destination after an overnight haul the trailers are pulled by tractors direct to the door of the consignee before the seals are broken. New flat cars recently purchased by the railroad accommodate three trailers each.

No-Accident Bonuses Awarded in New Jersey

A parade of fourteen buses containing trolley and bus operators marked the ceremonies on Dec. 19 in connection with the awarding of no-accident bonus prizes by Public Service Railway and the Public Service Transportation companies to operators in the Essex Division. The parade was from Lincoln Park to Public Service Terminal, Newark, where more than 800 operators gathered in the auditorium to receive their checks. The night operators received their bonuses in the morning and the day operators in the evening.

The no-accident bonus plan, put into effect in December, 1926, provided \$1 a week for each week in the year in which the operator had no accidents. In all the divisions throughout the state \$130,000 was distributed. In the Essex

Division approximately \$42,000 was awarded to 1,580 men.

President Thomas N. McCarter, introduced by James M. Symington, manager of the Essex Division, congratulated the men on their achievement and hoped they would receive larger checks next year. He emphasized the necessity of further co-operation on the part of the city authorities in stricter regulation of parking of private cars so that those who use the trolleys and buses, the great majority, may be transported safely, promptly and economically. Mr. McCarter asked Director of Public Safety William J. Brennan to co-operate to the fullest extent in his power in working out this problem.

Director Brennan also congratulated the operators on their showing under the no-accident plan and asked them to continue to give their best efforts in the cause of safety, guarding those who seem unable to guard themselves.

Fred M. Rosseland, executive manager of the Newark Safety Council, told what his organization is doing in the cause of safe transportation and Matthew R. Boylan, vice-president in charge of operation of the companies, praised the men for their records and asked them to be particularly careful at street intersections, as, he said, 63 per cent of all the accidents occurred at such points.

The playlet prepared by the safety education department, entitled "Whose Fault," was given at each session.



Group of Public Service railway and bus operators (Essex Division) in Newark Terminal auditorium during bonus award presentation

Norfolk's Cars and Buses in New Colors

Virginia Electric & Power Company officials have pointed out the rainbow to the company's master painter and said in effect: "Turn us out some street cars and buses that look like that." Certainly, so far as Norfolk is concerned, the day of the banana-colored street car is over. As fast as the company's rolling stock needs repainting it will be given one or several coats to outshine Joseph's multi-colored one. All cars and buses may be made as gay as the red, white and blue equipment now in service on the Naval Base line at Norfolk. But all won't be red, white and blue. The ten new buses recently ordered by the company will wear a blue, cream and orange dress. Two of them are on their way to Norfolk and the other eight will soon follow. These buses will be used on the Colonial Place line, company officials have announced.

Resumption of Service Demanded of Columbus Interurban

Demand that service under the terms of its franchise be established in Hague Avenue between Broad Street and Sullivan Avenue is made on the Indiana, Columbus & Eastern Railway by City Attorney Leach of Columbus, Ohio. Service was discontinued by the Columbus Railway, Power & Light Company more than ten days ago. local company had been supplying service for the interurban railway under a contract which has expired. Mr. Leach pointed out that the franchise held by the interurban railway calls for a fifteenminute city service in those streets. The city attorney said he would wait several days for a definite answer to his demand.

German Visitor Impressed by Chicago Operation

Since the item was published in the JOURNAL for Nov. 19, in which he commented on the railway situation in the United States, particularly in Grand Rapids and Chicago, Herr R. Schwanter, well-known German engineer and assistant director engineer of the Cologne Municipal Railway, has amplified the remarks he made at that time about operation in Chicago and the system there. He said:

I had heard in Germany that the Chicago Surface Lines handled by far the most people in an area with a population of about 3,000,000 with insufficient rapid transit lines. In the Loop, which is the most congested area I have ever seen, street car after street car ran, not crept, sometimes even faster, especially as to acceleration, than competing double-deck buses. The utmost skill is shown in the operation of surface cars, manned by very polite trainmen.

Other interesting features of the Chicago operation were the famous co-ordinated traffic signal system—we say in Germanv the "Green wave"—the systematic avoid-

ance of disturbing left-hand turns, the highest average scheduled speed I know of, the densest train schedule, operating like clockwork and without trouble, cars in very good condition, a high standard of maintenance, a fair fare system with its allowance of several changes and last, but not least, the best buses.

I got the impression that there must be excellent co-operation among management, employees and the public. I am convinced, especially by the Chicago Surface Lines, that the day of the last street car is farther away than ever, if managements and employees do not lose courage and energy.

California Fare Hearings to Be Resumed

The third of a series of hearings before the California Railroad Commission on interurban rates for the Pacific Electric Railway, Los Angeles, Cal., will be held on Jan. 17. Since the last hearing, held in October, a comprehensive survey of the properties and the operation of the railway has been under way. Five engineers have been detailed by the Railroad Commission to make this survey.

Particular attention has been paid to the elimination of stops, to speed and to general service. Since the meeting in October more than 100 stops over the entire Pacific Electric system have been eliminated by the commission's recommendation. The commission has in a number of cases recommended an increase in the frequency of service which the company officials have not felt warranted because of inadequate returns from those lines. In no case has any evidence been discovered of wasteful practices.

The company is requesting a raise of approximately 20 per cent in all interurban fares. It bases its request upon the fact that it is not earning an adequate return upon its investment. The company has never paid a dividend. The Southern Pacific, the parent company, a few years ago wiped out a deficit of \$15,664,884\$ accumulated since 1911, when the Pacific Electric was incorporated.

Railway Man to Promote Shipping Interest in Richmond

William E. Wood, president of the Virginia Electric & Power Company, Richmond, Va., has been appointed a member of the Richmond Port Commission. Fred H. Powell, president of the Richmond Common Council, named Mr. Wood, who is already a member of the James River improvement committee of the Chamber of Commerce. The port commission has been created to revive shipping interests of Richmond which in former years contributed largely to the city's commercial development. At one time Richmond's maritime activities extended to all parts of the world. A federal and local survey has recently been completed with the object of deepening the river's channel and providing extensive terminal improvements.

Company at Poughkeepsie Would Sell Right-of-Way for \$150,000

The Board of Supervisors at Pough-keepsie, N. Y., has taken preliminary steps to obtain such special legislation as may be needed to permit the county, if it desires, to acquire the right-of-way of the Poughkeepsie City & Wappingers Falls Electric Railway for the widening of the South Road. This end was attained through the acceptance of a report of the board's highway committee on the offer of the railway to sell for \$150,000.

The committee recommended that inasmuch as the board had received no information from the State Superintendent of Public Works concerning the reconstruction of the highway and had been furnished with no surveys nor preliminary plans specifying the lands to be needed, no action be taken at this time on the railway offer. The suggestion was made, however, "that the representatives of Dutchess County in the State Legislature attempt to procure any necessity legislation to authorize the Board of Supervisors of Dutchess County to ascertain the amount for which the right-of-way to maintain the trolley road between Wappingers Falls and Poughkeepsie would be abandoned and to appropriate such sums as the Board of Supervisors may determine to pay therefor."

Who Will Win American Waterworks Stock?

A stockholder of the American Water Works & Electric Company, Inc., the controlling company of the Monongahela West Penn Public Service Company, has offered a prize of five shares of common stock for the best article on "What Should My Company Mean to the Public?" Any employee of the American Water Works, or any of its subsidiaries, is eligible for the contest, with the exception of certain high officials.

The competition opened Jan. 10 and closes March 10. Essays must be limited to 1,500 words. Attached to the essay, but on a separate slip of paper, must be the writer's name and the company by which he is employed. The contestant's name, however, must not appear on the article itself.

Hearings on Boston "L" Legislation Begin Jan. 23

The legislative committees on metropolitan affairs and street railways, sitting jointly, have announced that public hearings on all proposed Boston Elevated Railway legislation will open on Jan. 23. The two committees have decided that the Elevated legislation, which is the most important problem before the General Court, should not be allowed to drag through the session, but should be taken care of in the early weeks of the year if possible.

Utility Education in Illinois Public Schools

A total of 33,000 paniphlets on electric railways has been distributed to the schools of Illinois by the Illinois Committee on Public Utility Information. The pamphlet is a revision of similar pamphlets used with success in previous years. It contains a brief history of the development of electric transportation systems and explains in non-technical language the construction of electric street cars and the method of operation. This pamphlet is one of a series issued by the Illinois Committee covering the various public utility services.

Public school teachers and principals have found these pamphlets very valuable in practical instruction of their pupils on subjects relating to public utilities. In connection with the use of the pamphlet on electric railways the Illinois Committee makes some suggestions to school teachers and principals for formal or informal debating and for rhetoric, oral English and current topics

classes.

Information Service in Baltimore

As a further aid to the public, the United Railways & Electric Company, Baltimore, has established an information service on the ground floor of the Continental Building, in the heart of the downtown section. This bureau also receives complaints. It was deemed advisable to open the bureau because the offices of the company are scattered on several floors of the building and a person seeking a certain department often experiences difficulty in finding the proper office. At a later date the company expects to enlarge the new department for the sale of car checks and commutation books.

Gary Paper Makes Appearance

Establishment of an employee magazine to be known as the Treadle has been announced by the Gary Railways, Gary, Ind. Beginning with the December issue, the new publication will make its appearance monthly, being distributed to each of the 350 employees. The first issue, of four pages, carries news of safety committee work, a new employee training course in elementary electricity, editorials and extensive department personals. It is made up in newspaper style with three columns to the page. Margaret K. Hanlan is the editor.

Service Records in Jackson Rewarded

Service buttons were recently delivered by the Jackson Railway & Light Company, Jackson, Tenn., to 40 of its employees who had been with the company five years and more. Two of the buttons went to men who had been on the payrolls for a quarter of a century,

two were for twenty years' service, seven were for fifteen years, nine for ten years, and the remainder for five years.

The 25-year and twenty-year buttons were of gold, the ten and fifteen-year buttons silver and the five-year buttons were bronze. A presentation speech was made by John Wisdom, general superintendent, who drew a 25-year button for his own services.

City Seeks to Recover From the Interborough

Formal approval of a claim against the Interborough Rapid Transit Company, New York, in favor of the city for \$9,783,770 was contained in a resolution adopted on Jan. 4 by the Transit Commission. The commission's action is equivalent to starting proceedings to recover this sum, as the amount in question is now automatically placed in a suspense account pending determination by the courts or arbitrators of the merits of the claim. The amount consists of sums charged against operation of the subways and the so-called certificate roads, extensions of lines covered by the dual contracts, which accountants for the Transit Commission contend are improper charges. position of the Interborough Rapid Transit Company in the matter has been stated previously in the Electric RAILWAY JOURNAL.

St. Paul Fare Hearing Deferred

Hearing by the Minnesota Railroad and Warehouse Commission of the application of the St. Paul City Railway, St. Paul, Minn., for increase in rate of fare was postponed on Jan. 5 until April 30. The action was asked by Corporation Counsel A. A. Stewart on the ground that the voters will hold a special election on March 13 on a charter amendment to permit the Council to effect relief from certain expenses of the railway such as was recommended at the time the commission announced a valuation and a rate of fare of 8 cents cash and six tokens for 40 cents. Voters have hitherto turned down similar proposed amendments. The property valuation was placed in 1925 at \$16,000,000 and the return authorized at $7\frac{1}{2}$ per cent.

Pierce Butler, Jr., representing the city, said the city is acting in bad faith as at the election a proposal will be considered for a municipal bus line, of which business the Twin City Motor Bus Company now has a monopoly. Chairman O. P. B. Jacobson of the commission said leaders for the city in the controversy had estimated the railway property valuation at \$9,000,000, and that he intends to find the basis for the figure and reasons for making it public. The proposed relief includes freedom from the cost of paving and maintenance of paving between car tracks and sprinkling amounting to several thousand dollars a year.

Why Only Ten Years More of Life for "Jim" Couzens?

If next August finds him among us mortals, James Couzens, United States Senator, one-time Mayor of Detroit and municipal railway advocate, will have lived one of the last ten years he desires. At least he is reported to have said on his 55th birthday that ten years more of life would be enough for him. His viewpoint is accounted for in the January, 1928, number of McClure's Magazine by Allan L. Benson, by whom Mr. Couzens is taken to task.

Railway people remember "Jim" Couzens as that successful young man who resigned as vice-president and general manager of the Ford Motor Company to become president of the Detroit Street Railway Commission, as that fiery municipal railway devotee who later negotiated the sale of electric railway lines to the city and who after serving as Mayor of that city resigned to accept an appointment to the United States Senate in 1922 made by the Governor of Michigan to fill the vacancy caused by the resignation of Senator Newberry.

Mr. Couzens' complaint is that he got out of his element too suddenly, dropped business too early and found too much time with little to do with it. His rise from a car checker in the Michigan Railroad yards at \$60 a month to general manager of the Ford company at \$150,000 a year covered only a few years in the span of a lifetime.

The writer of the article, who grew up with Mr. Couzens, rejects the philosophy "it is too late to begin" and says it must be exterminated from every life, whether the age be 35, 45 or 55. It is not too late for Mr. Couzens to develop new interests. He who made Detroit a better place in which to live, who devoted much money and time to public service must not relax. As Arthur Brisbane said about him many years ago, "Young in his early 40's, he has many years of useful work ahead and he intends that they shall be working years."

Three-Cent Mileage Rate Sought on Warren & Jamestown

The Warren & Jamestown Street Railway, operating between Jamestown and Warren, N. Y., petitioned the Public Service Commission on Jan. 10 for authority to increase its mileage rate to 3 cents in place of $2\frac{1}{2}$ cents and by increasing the number of fare zones, each with a 5-cent fare. Because of the extensive increase in the number of privately owned automobiles and highway development between Jamestown and Warren the company complains there has been a large decrease in the number of passengers it handles, with consequent loss to the company.

The increase requested by the company is approximately 20 per cent over existing fares. A similar application has been made to the Pennsylvania Public Service Commission.

Recent Bus Developments

Houston's Harrisburg Service to Begin Soon

Express buses to Harrisburg from Houston, Tex., will be put into operation about Jan. 15, Carl Frazer of the Houston Electric Company has announced. Eleven of the fifteen new buses for use on the line had arrived on Jan. 6 and the remaining four were expected at once. The downtown terminus of the Harrisburg line will be at San Jacinto and Preston. There will be express service from Milby to the Harrisburg terminus. The tentative arrangement calls for five to seven-minute service during the rush and ten to eleven-minute service for the off hours. The Harrisburg railway line from 67th Street to the present terminus near Brays Bayou will be retained for several weeks. It is planned to remove the tracks from 67th Street to the terminus when the bus service is perfected.

Appeal on Hoosier Transportation Rights

Notice of the appeal from the decision of the Indiana Public Service Commission to the Superior Court in Indianapolis on the petition of the Hoosier Transportation Company, Inc., for authority to pick up and discharge passengers on West Washington Street inside the city limits of Indianapolis has been filed with the secretary of the commission. The commission recently denied the petition after hearings, during which the Indianapolis Street Railway opposed the plea.

Worcester Consolidated Considers Bus Fare Protest

Residents of Fisherville, Mass., have entered a protest against the bus fare charged by the Worcester Consolidated Street Railway on the line between Wilkinsonville and Fisherville. The fare at present between these points is 20 cents and the distance is about 2 miles. Officials of the railway have taken the protest under advisement.

Substitution of Buses on Providence Line Denied

The petition of the United Electric Railways, Providence, R. I., to abandon railway service between Pascoag and Woonsocket and substitute buses has been denied by the Public Utilities Commission. In summing up the evidence presented at hearings on the company's petition to abandon service to Woonsocket and Pascoag, Chairman Bliss remarked that "if there is a general policy of this company that is in the public interests it should be disclosed in this

case as in all other cases." The commission said:

It does not seem to the commission on the facts presented that the petitioner has made out a case of public necessity and convenience, and we do not feel justified in depriving communities of the service in which the town councils are a unit in opposing this move.

The company witnesses testified that this line has shown a loss for a considerable period and that this company believed that bus operation would be profitable.

Business of Gray Line at Toronto Grows

The Toronto Transportation Commission, Toronto, Ont., is doing its share in bringing United States visitors to Toronto by the motor coach service to Niagara Falls and Buffalo. The revenue which Gray Coach Lines, Ltd., received from the Niagara Falls and Buffalo service in October was three times as large as in October, 1926, and in November it was more than four times greater than in the similar month last year.

Shore Line Coach Sold

Routes, station facilities and other holdings of the Shore Line Motor Coach Company, north of the city of Benton Harbor, Mich., were sold recently to the Motor Transit Corporation, Chicago, which operates the Safety Motor Coach Company, the Purple Swan Motor Coach Line and other interurban bus services in the Central West. The Shore Line Motor Coach Company is controlled jointly by the Chicago, South Shore & South Bend Railroad and the Gary Railways. Included in the sale was the Golder Arrow Motor Coach route, over which a de luxe non-stop service is maintained between South Bend, Ind., and Detroit. The Southwestern Michigan Motor Coach Company, Kalamazoo, which has been under the same general management as the Shore Line Company, was also pur-chased by the Motor Transit Corpora-

With the consummation of the sale on Dec. 31, the operations of the Shore Line Motor Coach Company became confined to northern Indiana and southwestern Michigan, where local permits and franchises are held. The company discontinued its service as of Jan. 1 connecting Benton Harbor, South Haven, Holland, Grand Haven and Muskegon. The Shore Line system consists of extensive motor coach routes in northwestern Indiana adjacent to Chicago. Local transportation is rendered in Hammond and between that city and Chicago, East Chicago, Whiting and Chicago Heights, Ill. Service is also

furnished between Gary and Chicago, Gary and Michigan City, Gary and Valparaiso and Michigan City and Benton Harbor.

Shore Line Motor Coach service between Chicago and Benton Harbor will continue to be operated in conjunction with the fast limited train service of the Sonth Shore Line. Shore Line Motor Coach passengers have the option of making the trip between Chicago and Michigan City, en route to Benton Harbor, on the electric interurban railroad, thus saving an hour in time.

Fares Equalized in California City

A certificate has been granted by the California Railroad Commission to the San Diego Electric Railway to operate auto passenger service between San Diego and El Cajon and intermediate points and to increase the fare from Lookout Avenue to Grossmont from 5 cents to 10 cents, and between Lookout Avenue and El Cajon from 15 cents to 20 cents. Other fares will be equalized.

Buses Soon Over Morris County Route

The first of the buses to be substituted for the cars of the Morris County Traction Company between Newark and Lake Hopatcong, N. J., has been received at Dover. O. G. Schultz, general manager of the company, said he expected the other buses before Jan. 15. If favorable action is taken by the Public Utilities Commission on the company's application to run the buses between Maplewood and Newark and for location of a terminal at Park Place, opposite the Hudson Tubes in Newark, Mr. Schultz said it was planned to begin the Morristown-Newark service as soon as the buses are ready. The Morristown-Lake Hopatcong line will begin operation shortly thereafter. Between Summit and Newark there will be a fifteen-minute schedule and an express service is to be maintained between Newark and Maplewood. It is expected there will be a shortening of time in the bus schedule as compared with that now followed by the cars. The bus schedules are being worked out.

Would Transfer Olean Bus Franchise

The Olean, Bradford & Salamanca Bus Line, Inc., holding certificates to operate in Salamanca, between Olean and the New York State line via Limestone, and between Bradford, Jamestown and Salamanca, applied on Jan. 6 to the Public Service Commission for authority to transfer its franchises and property to Alvin R. Bush, Phillipsburg, Pa. The petition states that all of the capital stock of the bus line is owned by the Olean, Bradford & Salamanca Railroad and that the bus line does not possess funds necessary to maintair, improve and operate the bus line.

Financial and Corporate

Merger in New Jersey

Bus and railway lines of Public Service Corporation to be consolidated under title "Public Service Co-ordinated Transport"

THE directors of Public Service Railway and of Public Service Transportation Company, Newark, N. J., have approved an agreement of consolidation and merger which will be submitted to the stockholders of the two companies for their action at meetings to be held on Jan. 31.

A new company is to be created, known as Public Service Co-ordinated Transport. Provision is made for the issuing of 2,500,000 shares of no par value common stock and 487,500 shares of non-cumulative preferred stock of no par value, which will have no voting rights but will receive dividends at the rate of \$6 per annum per share, for such years as in the judgment of the board of directors such dividend is justified and before dividends are paid on common stock. In the event of the dissolution of the company its preferred stock is to be entitled to a division of the assets at the rate of \$75 a share, before the common stock receives any part of the assets.

PRESIDENT McCarter Comments on Change

Under the terms of the agreement the 487,500 shares of no par value common stock of Public Service Railway outstanding will be exchanged for 487,500 shares of non-cumulative preferred stock of Public Service Co-ordinated Transport, and the 1,004,500 shares of common stock of Public Service Transportation Company outstanding for the same number of shares of common stock of the new company.

Thomas N. McCarter, president of Public Service Railway and Public Service Transportation Company, said in reference to the merger:

The consolidation of Public Service Railway and the Public Service Transpor-tation Company into Public Service Coordinated Transport is a forward step in improving local transportation conditions. It will, in the opinion of the directors of the two companies to be merged, accomplish two important objects. further co-ordination of street car and bus service with resulting economy and efficiency, and, second, an improvement of financial structure, including the possibility of an open end mortgage, which will make it easier to secure new capital for extension and betterment of facilities. The merger of Public Service Electric Company, Public Service Gas Company and United Electric Company of New Jersey into Public Service Electric & Gas Company has demonstrated the benefits of this character of consolidation, which is in the interest of the public as well as the stockholders.

The large increase in the number of passengers carried by Public Service cars and buses during 1927 demonstrates the demand for adequate transportation facilities, and

experience gained through the operation of both kinds of vehicles shows clearly that co-ordination of service is necessary in order to meet these demands adequately. This co-ordination, the merger of the two companies will assist in securing.

Traffic, Fare and Wage Figures

No reduction in the rate of decrease of electric railway traffic during November, 1927, was noted. Compared with a similar month of 1926 the rate of decrease is somewhat greater than reported in the previous months of the year, with the exception of July. The number of revenue passengers, including bus passengers, reported by 190 companies for November, 1927, compared with November, 1926, is as follows:

November, 1927		759,463,443
November, 1926		
Decrease, per ce	nt	2.52

The average cash fare in cities of 25,000 population and over:

														Cents
Dec.	1,	1927												7.9993
Nov.	1,	1927		,										7.9846
Dec.	1,	1926		,										7.7643

Average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:

	Average	Index
	Hourly	Number
	Rate	1913 = 100
	Cents	Per Cent
Dec. 1, 1927	57.27	210.17
Nov. 1, 1927		210.13
Dec. 1, 1926	56.88	208.73

Winona Line to Issue \$260,000 Notes

Authority to issue and sell \$260,000 of its 6 per cent ten-year gold notes was granted the Winona Railroad, Warsaw, Ind., on Dec. 31 by the Indiana Public Service Commission. Under the terms of the commission's order, the securities are to be sold at 94 per cent of their par value. Proceeds from this sale will go to reimburse the railroad's treasury for additions to properties already made.

Tulsa Tax Claim Settled

Tulsa, Okla., presented the Tulsa Street Railway with a receipt in full for more than \$30,000 of long overdue franchise taxes in exchange for a check for \$3,000. In return, the railway agreed to remove immediately the block to progress which has existed on the east side of the city since 1914. The company will lay new double tracks and pave its portion of the street for the unpaved distance of six blocks. New 80-lb. steel rails will be used.

Franchise taxes have been accumulating for several years, but the company has been unable to pay them. The recent increase in fares enables the company to pay expenses and make some necessary improvements.

Financing Plans Completed at Alliance

Plans for refinancing the Stark Electric Railroad and retiring an old bond issue were approved at a special meeting of stockholders held recently at the railway offices in Alliance, Ohio. The refinancing will be done with a \$500,000 7 per cent bond issue and \$250,000 of preferred stock, both of which were approved by the Ohio Public Utilities commission.

Directors of the Stark Electric were authorized to proceed to complete a contract between the Stark Electric and the Alliance Power Company, so they may be submitted at the annual meeting of the stockholders to be held on Jan. 19. The Alliance Power Company, organized several months ago, has taken over and is operating electrical generating equipment formerly owned by the Stark Electric. State commission officials have approved the proposed contract, which includes an easement right-of-way from Louisville to Damascus, a distance of 16 miles, to be purchased from the railway for \$22,500.

Amusement Plot Sold by Tri-City Railway

The Tri-City Railway, owner of the Black Hawk Watch Tower at Rock Island, Ill., has sold the 177-acre tract to the state of Illinois for \$200,000. The state will convert the plot into a park preserve similar to Starved Rock. The railway at one time operated the property as an amusement center.

Confirmation of Twin City Details Sought

The annual meeting of the stockholders of the Twin City Rapid Transit Company, Minneapolis, Minn., will be held at Jersey City, N. J., on Feb. 28, 1928. At this meeting officers will be elected and other business transacted, including such action as may be necessary or convenient legally to prevent any sale or transfer, pledge, hypothecation or other encumbrancing of the shares of stock of the Minneapolis Street Railway and the St. Paul City Railway, owned by the company, or any interest therein, so long as any of this company's first lien or refunding $5\frac{1}{2}$ per cent gold bonds. series A, remain outstanding and unpaid without the consent of the trustees named in the trust indenture securing said bonds. Action will also be taken to secure legally the retention by the Central Union Trust Company, New York, with which the shares are now on de-

Aggressive Policy Helps New Haven

According to the Wall Street Journal a shift in the winds of public sentiment in the past few years, and more particularly the stand of a courageous and aggressive management prevented further sale of outside properties of the New York, New Haven & Hartford Railroad at receivership prices, checked disintegration of the New Haven system and afforded opportunity to work out the problem of its investments. The management is making every effort to develop these properties to best advantage, to salvage and build up values. The same authority says that the comeback of the Boston & Maine Railroad and other properties in which the New Haven Railroad is interested inspires reflection as to what it would have stood to lose had it been forced out of these as it was out of the Rhode Island trolleys, Eastern Steamship and Merchants & Miners Transportation Company, all sold at a heavy sacrifice.

It will be recalled that under pressure from the government through a suit brought under the Sherman anti-trust law the New Haven management of that day, under the famous "consent" decree of 1914, was divested of virtually all extraneous properties. These included the Boston & Maine, controlled through the Boston Railroad Holding Company, the Connecticut Company, operating the Connecticut trolleys; the Rhode Island Company, the Berkshire Street Railway, the Vermont Company, the Westchester Street Railway, the New York & Stamford Railway and the New England Investment & Security Company, which controlled the Springfield Street Railway and the Worcester Consolidated.

In 1925, the dissolution decree was nullified completely by the court, which directed the handing back to the New Haven of the Connecticut Company, the New York & Stamford Railway, the Berkshire Street Railway, the Vermont Company and the New England Investment & Security Company, controlling the Springfield Street Railway com-panies and the Worcester Consolidated.

The Wall Street Journal says:

The Connecticut Company for many years has earned its fixed charges and something over on its \$40,000,000 stock, which is owned entirely by the New Haven. Its total investment in this company is above \$45,500,000, but the independent appraisal which is being made of the value of the Connecticut Company properties indicates that the valuation will more than support New Haven's investment therein.

While the court order permitted return of the Springfield Street Railway and the Worcester Consolidated, the New Haven also had to get special legislation in Massachusetts and authority from cities towns served to resume operation of these properties. These were secured, the New Haven stating that it was prepared to expend \$1,000,000 on each of the properties for their rehabilitation and development. It has made many improvements, supplementing railway lines with bus lines and adding new equipment.

Thus the New Haven management has

gone ahead making the most of its opportunities for service, preserving the integrity of its property and developing its outside investments.

Decline in Traffic in St. Louis in November

The number of passengers carried by the United Railways, St. Louis, Mo., fell off 1,359,276 in November compared with a similar month in 1926, according to statistics compiled by the St. Louis Public Service Company, which succeeded the United Railways on Dec. 1. The figures were 21,098,039 and 22,457,-315. An 8-cent base fare with two tokens for 15 cents was granted the company by the Missouri Public Service Commission on the assumption that the new rates would yield the company \$119,056 a month more than the old rate of 7 cents straight. Figures for November show that an increase of only \$16,729 was realized.

\$19,610 for Municipal Railway Equipment at New York

The public auction sale of trackless trolley cars and trolley cars held by the Department of Plant and Structures, New York City, N. Y., on Dec. 5, 1927, and continued on Dec. 28, 1927, resulted in the disposition of the material used by the city in municipal railway operation in five lots.

Lots 1 and 2 were awarded to L. Schiavone and Bonomo Brothers, Jersey City, N. J., the highest bidders, as

Lot 1. Seven Atlas trackless trolley buses, stored at carhouse at Con- cord, Staten Island, N. Y \$385 Lot 2. Fifteen Brockway trackless trolley buses. Ten stored at car-
house at Greenridge, S. I., and five
stored at carhouse at Concord.
Staten Island, N. Y 825
Total\$1,210
Lot 3. Thirty-eight Birney type trolley cars, stored at carhouse at Concord, Staten Island, N. Y \$6,000 Lot 4. Fifteen Second Avenue type trolley cars, stored at carhouse at Concord, Staten Island, N. Y 2,400 Lot 5. Thirty-three Birney type trolley cars, stored at Williamsburg Bridge carhouse, Bedford Avenue, between South Fifth and South Sixth Street, Brooklyn
Sixth Street, Brookivn 10,000

Total\$18,400

SUMMARY OF OPERATIONS OF THE NEW YORK STATE RAILWAYS FOR THE YEARS

Railwayoperating revenues	., 31	1926 \$10,351,484 7,588, 7 55		1925 \$10,027,906 7,199,139
Net revenue railway operations		\$2,762,728 495		\$2,828,766 1,247
Net operating revenue Taxcs assignable to railway operations		\$2,763,224 659,422		\$2,830,014 695,146
Operating income		\$2,103,801 \$8,194*		\$2,134,868 132,942
Grossi ncome		\$2,065,607 1,536,601		\$2,267,810 1,507,671
Net income Sinking fund appropriations. Dividends 5 per cent cumulative preferred stock (see note)	(5%)	\$529,006 31,603 193,125	(5%)	\$760, 138 32,664 193,125
Earned on common stock	(1.52%)	\$304,278	(2.68%)	\$534,349

*Adjustment of excess of specified return under service-at-cost contract, city of Rochester.

Decrease in Riding in Decatur

Car lines in Decatur, III., operated by the Illinois Power & Light Company, showed a marked decrease in transportation in 1927, despite the small decrease in total mileage. The mileage was 998,-638, a decrease of 52,500 miles, and the passengers numbered 5,112,457, a falling off of 456,000. Approximately 20 per cent of the passenger travel was on transfer.

Would Abandon Nine-Mile Line in New Hampshire

Massachusetts Northeastern Street Railway has petitioned the Public Service Commission of New Hampshire to abandon railway service on certain of its lines in that state. The particular line set forth in the petitions names the railway route between Plaistow and Rowes Corner in Newton, a distance of 9 miles. In its petition for abandonment the company claims it sustained a loss on this line in 1926 of approximately \$9,000. Operating expenses were decreased during 1927 by making fewer runs over the line and the loss was not so great.

Binghamton Sale Put Off

Sale of the properties of the Binghamton Railway, Binghamton, N. Y., has been indefinitely postponed. At first the sale under foreclosure proceedings was set for Dec. 1, 1927, and later was deferred to Jan. 5, 1928. The railroad proper consists of 47.72 miles of single and double track.

Report Issued on New York State Operations

The New York State Railways, operating in Rochester, Syracuse, Utica and Uneida, reports a net income of \$529,-006 for the year ended Dec. 31, 1926, against a net of \$760,138 for the year previous. Contained in the report is a comparative statement of the earnings and expenses for 1926 and 1925, which is shown herewith.

Book Reviews

Mundy's Earning Power of Railroads

New York and Chicago: James H. Oliphant & Company, 1927. 568 pages.

The 22d issue of the Floyd W. Mundy compilation is a comprehensive study of stocks, funded debt, mileage, revenues, expenses, maintenance, dividends, valuations and other important factors in the earning power of one of the greatest utilities. In the interest of the investor these statistics are arranged to give the best available information on the value of stocks or bonds of any railroad and to permit easy comparison.

Engineering of Power Plants

By R. H. Fernald and G. A. Orrok. Third edition. New York: McGraw-Hill Book Company, Inc. 663 pages. Price, \$5.50.

Twenty-six chapters in this book outline the whole power-station field as it exists today and introduce to readers the equipment available and the present practices in power-station design. All through the book an economic and commercial rather than a theoretical point of view is found. The authors discuss power plants in terms of equipment or of application. While primarily a college text book, there are many engineers who will find it valuable.

Electrical Power Transmission— Principles of Design and Performance

By E. A. Loew, professor electrical engineering University of Washington. New York, N. Y.: McGraw-Hill Book Company. 400 pages. Price, \$4.

The first seven chapters are devoted largely to a discussion of the mathematical tools and the underlying circuit theory of the transmission line. The last seven chapters discuss the mechanical features of line design with a study of the economics of line design as influenced by both the mechanical and electrical features.

Transactions of the National Safety Council

Sixteenth Annual Safety Congress, held in Chicago, Sept. 26 to 30, 1927.

Proceedings of the 1927 Safety Congress are published in several parts. The one of most interest to electric railway men, naturally, is the report of the Electric Railway Section, comprising 88 pages. Other sections, of nearly as much interest, are the Public Utilities Section, the General Sessions, and the Transactions of the National Safety Council (Public Safety Division). Those that took part in the Electric

Railway Section are prominent in the electric railway field, and the discussions and papers are intensely practical.

The Principles of Bond Investment

By Lawrence Chamberlain and George W. Edwards. New York, N. Y.: Henry Holt & Company. 700 pages. Price, \$7.50.

For sixteen years Chamberlain's "The Principles of Bond Investment" was known as "The Bible of Wall Street." It was the precursor of a long list of similar books. Since the original book was written, however, there has been a period epochal in that it has witnessed a world war, a new banking system and a system of taxation that is virtually new.

Moreover, certain industries have in the meantime atrophied, others have been created, old types of securities have disappeared, others have assumed greater importance and new types have sprung into being. In consequence almost all the old matter has been rewritten and a number of new chapters have been added. In the book as it is now rewritten, the intricate subject of taxation has received the attention that it deserves. If the investment trust appears to have been neglected, that is only because this practice applied to the idea of diversification is still too young as a practice in the United States to warrant its inclusion.

So much for the book in general. To be more specific, there is an excellent chapter "Public Utility Securities" also a special chapter "Street Railway Bonds." In both of these public utility operators will he interested, but electric railway men particularly in the authors consideration of street railway bonds. Naturally the attention given to this subject in a work of this kind is not exhaustive, but the conclusions are very much to the point, borne out by many quotations, not a few of which are from the Electric Railway Journal.

Some of the inherent defects in street railway bonds under the old form of mortgages are pointed out, but the authors say that during the last decade changes in the financial structure of electric railways, as in practically all utilities, have eliminated many undesirable features. They hold to the view that the investor should not turn away because of the many failings of the electric railway class, but rather that he should remember that there are numbers of splendidly equipped and well developed companies with records and ca-pacity for earning beyond question. In conclusion they say that only men of affairs capable of diagnosing reports, and seeking a large return from a form of investment that is fairly convertible, should seek to meet their needs with electric railway bonds. Of incidental interest to electric railway operators is the chapter in which the authors discuss equipment trust obligations.

Despite the growth of investment literature in recent years "The Principles of Bond Investment," with all due respect to other treatises, appears to be in no danger of having its previous place as "The Bible of Wall Street" ursurped by any other aspirant to such honors. It is still the classic volume in its own field.

Die Elektrifizierten Hauptlinien der Schweizerischen Bundesbahnen

By J. Göttler. Berne: Bolliger & Eicher, Price, 2 Swiss francs (40 cents). 56 pages, illustrated.

This is a technical account of the electrical equipment of the Swiss Railways brought up to date. It gives a general review of the work, accounts of the power stations, transmission systems, substations, overhead conducting system and locomotives, with some particulars of the results of operation, cost and financial results.

Employee Magazines in the United States

Prepared and published by the National Industrial Conference Board, Inc., New York, N. Y. 89 pages. Price, \$1.50.

Analysis of a large number of employee magazines was made in order to prepare this digest of ways and means of publishing them. Considerable help was received from a number of editors of successful publications of this sort. Their advice and views are printed at some length, as well as the judgments of the compilers.

Deutscher Reichsbahn-Kalender for 1928

Published by the German State Railway Company, Berlin, Germany.

The German State Railway has issued an attractive calendar for 1928 with three leaves per week, or 156 altogether. It is illustrated by views of places reached by the system, with some historical views. Illustrations of electrically equipped lines are included.

Water Power Bonds— 1927 Edition

New York: Minsch, Monell & Company, Inc. 90 pages.

Statistical data including descriptions, a table of comparisons and a chart are featured in this sixth edition. Information is collected in regard to water power development, 55 hydro-electric companies and the securities of the latter as investments. The booklet is intended for the investor and layman "who cannot be expected to be acquainted with the technicalities nor the common phraseology of the hydro-electric industry."

Personal Items

J. B. Potter Made Manager at Wilkes-Barre

J. B. Potter has resigned as manager of the Bridgeport and Norwalk divisions of the Connecticut Company's railway and bus lines, effective on Feb. 1, to become general manager of the Wilkes-Barre Railway, Wilkes Barre, Pa. Mr., Potter will be succeeded at Bridgeport

by Frank L. Kibling.

After he was graduated from Cornell University Mr. Potter went with the Westinghouse Electric & Manufacturing Company. Here he learned the rudiments of the electrical industry, and from 1898 until 1900 he was an engineer for Sanderson & Porter, New York. He next entered the railway industry as superintendent of a line operating between Worcester, Mass., and Central

Village, Conn.

In 1907 Mr. Potter became manager of the New York & Stamford Railway and the Stamford and Norwalk divisions of the Connecticut Company and remained in these posts for a period of ten years. In 1917 he was appointed manager of utilities for Sanderson & Porter, New York. He resigned this position in July, 1919, to become engineer in charge of economies of the Federal Light & Traction Company, New York. In 1920 he returned to the Connecticut Company as manager of the Bridgeport and Norwalk divisions.

Mr. Kibling, who succeeds to the managership, has been with the Connecticut Company since 1905. He started as a motorman. In 1909 he was appointed starter and subsequently became chief instructing motorman. In 1912 he was made dispatcher and in 1914 became superintendent, the position from which he is promoted to succeed Mr. Potter.

Changes on California Commission

Following the custom heretofore established of rotating the presidency of the commission each year, Ezra W. Decoto retired Jan. 3 as president of the California Railroad Commission and Leon O. Whitsell was elected president

for the year 1928.

President Whitsell has been a member of the Railroad Commission since 1925 and was reappointed for a full term of six years by former Gov. Friend W. Richardson on Jan. 1, 1927. He was appointed from Orange county where he was a member of the Board of Supervisors. He was a practicing attorney for many years before engaging in citrus growing in southern California. He resides at Burlingame.

F. O. WHITEMAN, service agent of the East St. Louis & Suburban Railway, East St. Louis, Ill., and its subsidiaries, was recently appointed superintendent of service. This appointment placed him in charge of the transportation department in addition to his duties in the passenger and freight departments. His office was removed from the Eads Bridge station to the main office.

J. C. Guild, Jr., New Chattanooga Manager, Well Known in South

Jo Conn Guild, Jr., whose appointment as general manager of the Tennessee Electric Power Company, Chattanooga, Tenn., to succeed the late B. C. Edgar, was referred to in the ELEC-TRIC RAILWAY JOURNAL, issue of Jan. 7, is widely known in Nashville, Chattanooga and elsewhere throughout the State. For the past 4½ years he has



J. C. Guild, Jr.

served the Tennessee Electric Power Company as vice-president.

The new executive upon leaving Vanderbilt University in 1908 engaged in construction work at the Hales Bar power plant. This project was one of the outstanding engineering achievements of its character in the South. Mr. Guild was identified with the work during the last four years of the project, holding at the completion of the work the position of assistant resident engineer. Immediately thereafter, in 1913, Mr. Guild entered the employ of the Chattanooga & Tennessee River Power Company in Chattanooga in new business development work, with special attention to the sale of electric power to the new and expanding industries in his home city.

In 1915 he was appointed to the post of general manager. Several years later, when the Chattanooga & Tennessee River Power Company was consolidated with the Chattanooga Railway & Light Company and Tennessee Power Company into the Tennessee Electric Power Company, Mr. Guild became vice-president of the combined companies. In the meantime he had become closely identified with

the growth and development of Chattanooga's business life.

Mr. Guild, of distinguished ancestry, was born and reared in Chattanooga. He received his early education at the Baylor School in that city, later matriculating at the University of Virginia. After two years he transferred to Vanderbilt University in the engineering

His contacts with the public in general early made Mr. Guild, like his predecessor, a firm believed in the policy of maintaining good public relations between the power company and the customers it serves. He frankly advocated the widest possible dissemination of information regarding the affairs, policies and progress of the Tennessee Electric Power Company through the press. As a result, in the fall of 1923, Mr. Guild was designated, in addition to his other duties, to supervise the sale of the company's preferred stock on the customer-ownership plan.

The new executive has been closely associated with the late Mr. Edgar in all of the operating problems and policies of the company and is considered fully qualified by experience, ability and training to take over the reins of one of the largest concerns of its kind in

the South.

New Assignments in Fort Worth

A. J. Rowe, assistant manager of the Northern Texas Traction Company, Fort Worth, Tex., has been made assistant superintendent of transportation in a new schedule of personnel changes announced by A. F. Townsend, manager of the company.

A. A. Chamberlain, in addition to his duties as assistant treasurer, has taken on the new duties of general passenger agent and supervisor of

advertising.
F. W. Mayborn will be actively engaged in advertising work, though continuing in his capacity as assistant

general passenger agent.
C. H. Bowen remains as superintendent of city transportation.

L. H. Church With "Journal"

Leonard H. Church, with the editorial staff of the Electrical World for the past year and a half, first in New York and more recently in Cleveland, has been appointed editorial representative of the Electric Railway Journal in Chicago, with the title of assistant editor. For three years before he assumed editorial duties in New York, Mr. Church was a member of the faculty of the electrical engineering department of the Kansas State Agricultural College, Manhattan, Kan. In addition to his academic work Mr. Church, while he was in the West, served as a consulting engineer on the Red Wing rural project in Minnesota and specialized in rural electrification in Kansas.

Manufactures and the Markets

\$529,655 Budget at Houston

The 1928 budget of the Houston Electric Company, Houston, Tex., lists expenditures totaling \$529,655. The budget is \$125,000 more than the 1927 budget. Important features in the 1928 plan of the company include removing the carhouse at Texas and Brazos and relocating on the old circus grounds on Silver and Sabine, placing \$181,000 worth of buses on the Harrisburg line, building a big garage at the Texas and Brazos carhouse, erecting a steel trestle over White Oak Bayou, etc.

More land has been acquired by the company in the rear of its present carhouse at Texas and Brazos and the garage and machine shop will be built over all the area.

The interurban station and express Rubber-covered wire, N. Y., No. 14, per house will remain on the present location. Contract for paving the gravel portion of Texas Avenue from Louisiana to the bayou and in front of the interurban office has been let.

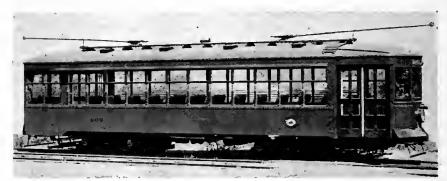
METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	Metals—New York Jan.	10, 1928
	Copper, electrolytic, cents per lb	13.875
	Copper wire, cents per lb	75-16.00
	Lead, cente per lb	6 50
	Zinc, cents per lb	6.00
	Tin, Straits, cents per lb	56.125
,	Bituminous Coal, f.o.b. Mines	
	Smokeless mine run, f.o.b. vessel, Hampton	
	Roads, gross tooc	
	Somerset mine run, Boston, net tons	
•	Pittsburgh mine run, Pittsburgh, net tons	
	Franklin, Ill., screenings, Chicago, net tons	1.65
	Central, Ill., ecreeninge, Chicago, net tons.	1.45
	Kansas screenings. Kansas Citv. net tons	2.175
	Materials	

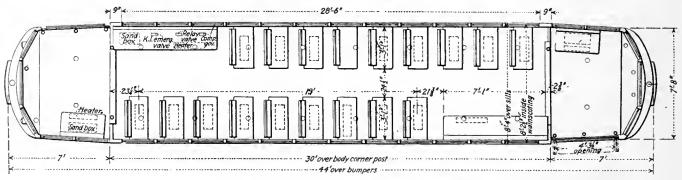
1,000 ft	5.50
Teatherproof wire base, N.Y., cents per lb.	16.75
ement, Chicago net prices, without bags	2.05
inseed oil (5-bbl. lots), N. Y., cents per lb	10.10
bite lead in oil (100-lb. keg), N. Y., cents	
per lb	12 75
urpentine (bbl. lots), N. Y., per gal	0.67

Eight Attractive Cars for Beaver Valley Traction





Interior and exterior appearance of the eight units delivered last fall to the Beaver Valley Traction Company



The cars are 44 ft. 4 in. over all and seat 50 passengers

Supplementing the preliminary specifications published in the JOURNAL for June 25 are the above illustrations showing the type of one of the eight one-man, two-man double-truck cars ordered by the Beaver Valley Traction Company, New Brighton, Pa., in May, 1927. These units were manufactured by the Osgood-Bradley Car Company, Worcester, Mass., and delivery was made in September. As noted in the Journal of June 25, the order for these units followed the rehabilitation of ten of twenty recently purchased cars which were found not to conform to the standards of ease and refinement set by the company for its patrons. The cars have an overall length of 44 ft. 4 in. Entrance and exit doors will be on the right side only.

The units are of semi-steel construction and are driven by Westinghouse No. 510-E inside hung motors. The exterior color scheme is in orange and the interior trim mahogany. The most modern safety devices have been installed. Revised specifications are as follows:

 Osgood-Bradley Car Company, Worcester, Mass.
 Date of order
 May, 1927

 Date of delivery.
 Sept. 8 to 15, 1927

 Bolster centers.
 20 ft. 0 io.

 Length over all.
 44 ft. 4 in.

 Length over body posts.
 30 ft. 0 io.

 Truck wheelbase.
 5 ft. 6 in.

 Width over all.
 8 ft. 6 in.

 Width over all.
 11 ft. 1½ in.

 Window post spacing.
 28½ io.

 Body.
 Semi-steel

 Roof.
 Arch

 Doors.
 End

 Air brakes.
 Weetinghouse
 Onduit Trausco Westingion Control Westingion Control Metropolitan drawbars Illunter

Doors Folding
Fare boxes Railway company's standard
Finish Paint
Floor covering Battleship linoleum
Gears and pinions Weetinghouse
Glass J-in crystal
Hand brakes Peacook etaffless Floor covering. Battlessup nuoleum
Gears and pinions Weetinghouse
Glass. \$\frac{1}{2}\text{-in}\$, crystal
Hand brakes. Peacook etafflees
Heaters. Consolidated Car Heating Company
Headlights. Golden Glow TR-128
Headlining. \$\frac{1}{2}\text{-in}\$ Agasote
Interior trim Mahogany
Journal bearings Plain
Journal boxes. Symington
Lamp fixtures. Keystone-Ivanhoe No. 1022
Motors. Westinghouse No. 510-E, inside hurg
Painting scheme (color uscd). Orange
Registers. Railway company'a atandard
Roof material. Wood
Safety car devices. Safety Car Devices Company
Sash fixtures. Edwards
Seats. Hale & Kilburn No. 300
Seat spacing. 28\frac{1}{2}\text{-in}\$
Seating material. Leather, maroon
Slack adjusters
Americaa Brake Company's Form "J"
Steps. Folding
Step treads. Ash
Trolley catchers. Ideal
Trolley base. Nutsal No. 20

Steps. Folding
Step treads . Ash
Trolley catchers . Ideal
Trolley base. . Nuttall No. 20
Trolley wheels . More-Jones
Trucks . Standard Motor Truck Company's C-35-P-1.
Ventilators . Nichols-Lintern Type 'C'
Wheels, type . 28-in, wrought steel

Another Southland City gets twelve new cars equipped

Work on Twelve Macon Cars Progresses

The twelve new cars being built by the Perley A. Thomas Car Company for the Macon Light & Railway Company are scheduled for delivery in November. The cars, which are of the one-man, double-end, double-truck type, have an over-all length of 41 ft. 8 in. and a seating capacity of 40. The exterior color scheme is of green and cream, while the interior trim is of cherry.

Specifications covering the cars are appended here:

appended note.
Number of units
double end, double truck Number of seats
Date of orderJune, 1927
Date of deliveryNovember Length over all
Truck wheelbase
Date of derivery Astronomorphic Length over all
Roof Arch
Doors
AxlesA.E.R.A. E-2 Phys. prop. E-5-24 Car signai system
Control K-35-KK
Curtain fixturesCurtain Supply Co.,
Curtain material. Pantasote, double grain color 86 Destination signs Keystone ILR and RLR Door mechanism National Pneumatic or Consolidated
Doors
Gears and pinions. G.E., long and short addendum
Glass Plate and D.S.A. Hand brakes Peacock staffless Hand strans Rice retrieving
Hand straps
Hesdlining 18 Haskelite Interior trim Natural cherry Journal Bearings Plain
Journal boxes Taylor
Lamp fixturesKeystone center dome MotorsFour G.E264, inside hung Painting schemeGreen and cream
Registers Ohmer Roof material 7g-in, poplar
Sash fixtures Curtain Supply Co. brees such
Seats
Slack adjustersAmerican, Form E-1 StepsStationary
Slack adjusters
Trolley wheels Nuttall 4-in. Trucks Taylor, type M Ventilators Nichols-Lintern, type C Wheels 26-in. cast chilled
Wheels
Wheelguards

Electric Railway Journal, October 15, 1927, page 764. with
'Peacock"

Staffless Brakes

Twelve new cars, equipped with "Peacock" Staffless Brakes, were recently ordered by the Macon Light & Railway Company from the Perley A. Thomas Car Company.

They are to have a seating capacity of 40 and are of the one-man, motor, city, double-end, double-truck type.

North, South, East and West! Wherever new cars are ordered "Peacock" Staffless Brakes are usually found in the specifications. May we tell you why?

National Brake Company, Inc.

890 Ellicott Square

Buffalo, N. Y.

Canadian Representative Lyman Tube & Supply Co., Ltd., Montreal, Can.





Seats 25 passengers. Mounted on a White Six Model 54 Chassis, 227-inch Wheel Base. Rugged but not clumsy. Strong but not cumbersome. Roomy without wasting space. No crowding. No discomfort. Ease, rest, proper ventilation. Low maintenance cost.

No wonder Bender's repeat business is so large!

Note these points: Seats comfortable and restful, with specially designed slant to backs, round roll soft headrests at

tops. Equipped with complete lavatory, wash stands fitted with wash bowls and faucets, liquid

soap containers, etc. Fresh drinking water always accessible.

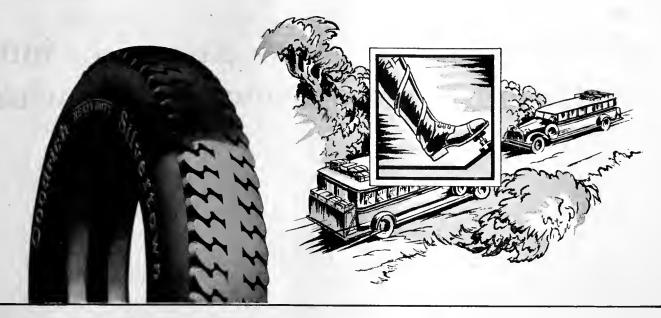
Safety, with Strength

Note, too, the observation rear effect with plate glass all about rear, providing maximum light and vision for passengers and also full rear view for driver. On the roof forward are trunk-type luggage boxes with Weathertite lids. Overflow rails at rear of trunk-luggage boxes designed to take care of extra bags and parcels.

Let Bender work with you on your next bus body requirement.

THE BENDER BODY COMPANY
W. 62nd and Denison, Cleveland, Ohio

BENDERBODIES



Keeping on schedule isn't all in the throttle



By an extra toughening process, Goodrich has protected Heavy Duty Silvertowns from the hidden causes of roadside failure. When these tires are made, they are toughened from inside and outside both, instead of from outside only. The Goodrich Water Cure reaches the deepest layers of rubber—bonding the plies

together—giving a tighter grip between tread and carcass.

That is one of the important reasons that fleet owners report such dependable performance from Goodrich Heavy Duty Silvertowns. Extra rubber between plies under the tread—extra spacing of cords in outer plies—tread and sidewalls one continuous piece from bead to bead—and a highly successful tread design all do their part in helping maintain your schedules and reduce your mileage costs.

THE B. F. GOODRICH RUBBER COMPANY, Est. 1870 Akron, Ohio In Canada: Canadian Goodrich Company, Kitchener, Ont.

Goodrich HEAVY DUTY Silvertowns

HIGH PRESSURE OR BALLOON

Salesmanship may play a part in the initial the strength of performance and knowledge

In 1926

Standardization of fleets is the growing trend, influenced by the desire for economy in maintenance, responsibility for performance centered in one source of supply and to cement good-will on the part of the riding public by giving them the motor coaches which they like and to which they are accustomed.

YELLOW COACHES

A General Motors Product

purchase—but repeat orders are placed on gained by experience

Jan. 1 to Dec. 31, 1927

Repeat orders of Yellow Coaches to Utilities indicate a swing toward standardization based on not only that satisfaction arising from dependable and economical operation, but on servicing routes with motor coaches to which experience has shown the public responds. Yellow Coaches are route builders. They are also fleet builders.

YELLOW TRUCK & COACH MANUFACTURING CO. SUBSIDIARY GENERAL MOTORS CORPORATION
5801 WEST DICKENS AVENUE, CHICAGO, ILL.



he present lang Bodies incorporate every feature of comfort and utility of advance of future necessity lang will always anticipate additional features

Alter allit's the Setting that counts | "



or example: the Lang All-Metal Body

Not alone in De Luxe Parlor Coach Bodies does Lang incorporate luxury.

The short-haul city rider is entitled to comfort—and gets it in this Lang All-Metal Body, luxurious even for city service. More rides more often is the result.

Clear vision front, narrow steel frames, easily replaced panels, single raise sash, pleasing interior and exterior lines; all these and many other features testify to the knowledge of Lang craftsmen who are always in touch with the inherent needs of steel body construction as applied to railway and motor bus service.

Whether built on a new or an old chassis, Lang Bodies create passengers. They are the very last word in modern body design and construction.



THE LANG BODY COMPANY, CLEVELAND, OHIO

LANG BODIES create new passengers

Heavy Duty Cushion Tire combines in one product the proved principles of all cushion tire building. No antiquated methods or machinery to cling tonothing to stop General at any point short of the absolute limit of perfection



GENERAL

TIRE

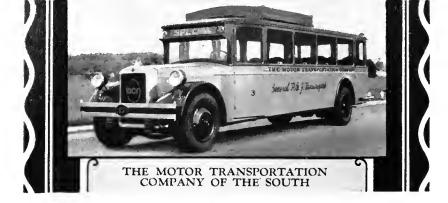
-goes a long way to make friends

BUILT IN AKRON, OHIO, BY THE GENERAL TIRE AND RUBBER CO.



1927-an Q.C.f. Year!

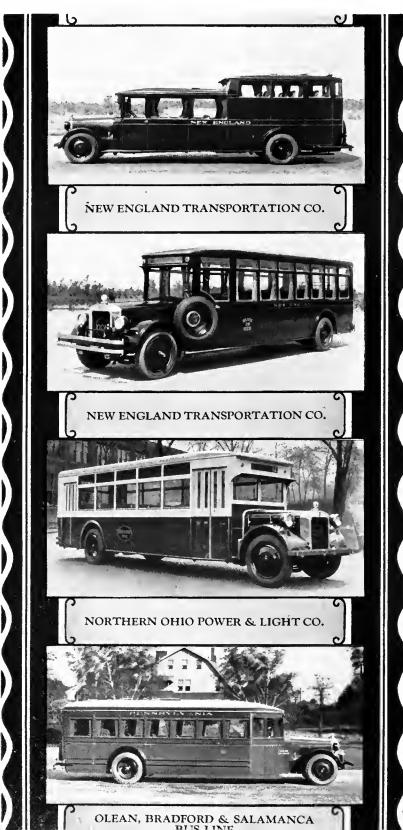




Q.C.C Mechanical Drive Models

23-Passenger Urban Coach 30-Passenger Urban Coach 16-Passenger Parlor Coach 21-Passenger Parlor Car 27-Passenger Parlor Car 60-Passenger Double Deck (Fully Enclosed)

QCf-the standard



1927 has been an Q.C.C year, considering the number, size, and character of the great transportation organizations which purchased Q.C.C equipment.

Little less impressive is the *variety* of Q.C.f. motor coach equipment which has gone into every type of service. For urban or long distance operators, for street car or parlor car operations of any kind, there are exactly suitable Q.C.f. models, in the opinion of experienced transportation experts—opinion backed by orders and repeat orders representing millions of investment.

In attractiveness, comfort, quiet, durability and revenue-possibilities Q.C.C. Parlor Cars have still further widened the margin of leadership which was established with the introduction of this Q.C.C. type. The Q.C.C. Parlor Observation Coach, with its "mezzanine" section, is showing operators the profitable solution for many problems. Rear seats invariably fill first in this coach and may command extra fare! There is no wheel-house interference. Baggage loads at curb level and is fully protected. Express business alone may pay operating costs.

Only Q.C.C manufactures this remarkable revenue-builder, for it is fully protected by patents.

21-Passenger Express Special 40-Passenger Metropolitan All-Steel Coach

Q.C.f. Gas-Electric Drive Models

30-Passenger Urban Coach 60-Passenger Double Deck (Fully Enclosed)



of Great Operators

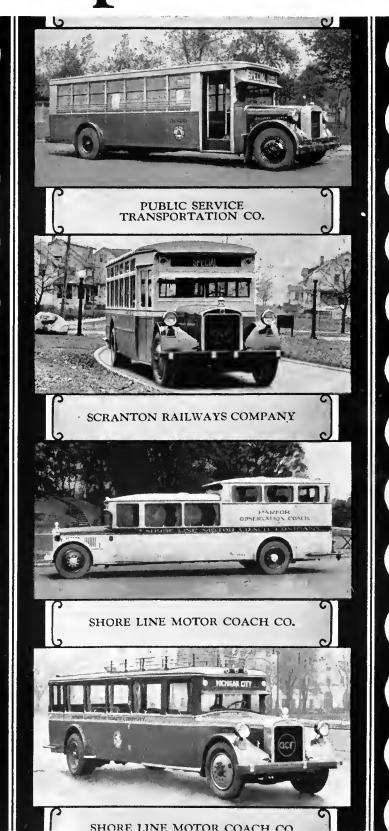
In the Q.C.C. Urban types, fine appearance, space and visibility for standees, fast loading and unloading, and other features are showing operators the advantages of Q.C.C. universal transportation experience.

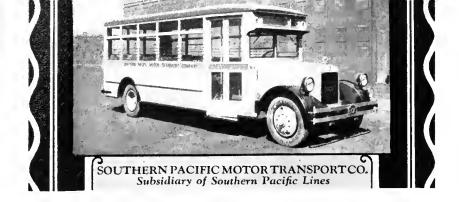
With the Q.C.C Express Special operators are for the first time successfully offering direct competition to the private motorcar—in comfort—in speed—in class. This high-fare, high-grade service is attracting a type of business hitherto entirely out of reach.

The 40-passenger Metropolitan All-Steel Q.C.f. Coach enables coach lines to rival any other form of mass transportation for high total of passenger-miles per vehicle mile. Without increasing base schedules or coach-mile expense, peak loading can be almost doubled, typifying the unfailing ability of Q.C.C equipment to improve the ratio of income to operating expense. Whatever the operating conditions they can be met entirely and more profitably and at the most reasonable initial investment without going outside the complete Q.C.C line. Study the long list of noted operators who vouch for it by their 1927 Q.C.C investments.

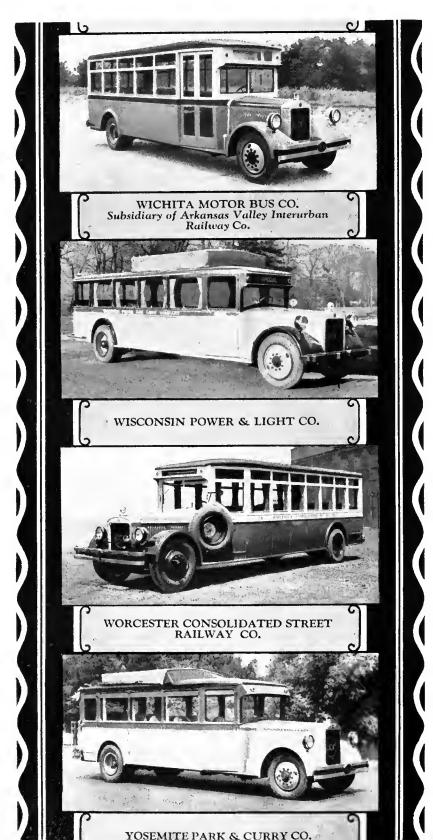
AMERICAN CAR AND FOUNDRY MOTORS COMPANY

30 CHURCH STREET NEW YORK





Who uses them



Some of the large Transportation Organizations which invested in Q. C. f. Coaches during 1927:

Blue Line Stages, Boise, Idaho Bridgeport & Waterbury Passenger Service, Inc., Bridgeport, Conn.

Buffalo & Akron Transit Co., Buffalo, N. Y.

Capital Traction Co., Washington, D. C.

Carolina Coach Co., Raleigh, N. C.

Cincinnati-Hamilton Bus Co., Hamilton, Ohio

Cleveland, Pittsburgh Motor Stage, Inc., Cleveland, Ohio

Coast Auto Lines, Coquille, Ore.

Detroit, Toledo & Cleveland Bus Co., Cleveland, Ohio

Division Ave. Bus Line, Grand Rapids, Mich.

Dixie Safety Coach Line, Atlanta, Ga.

Eagle Motor Coach Line, Peoria, Ill.

Eagle Motor Lines, Roanoke, Va.

Eastern Mass. Street Railway Co., Boston, Mass.

Eastern Public Service Corp., Washington, D. C.

Ft. Dodge, Des Moines & Southern Transportation Co., Boone, Iowa

Grand Rapids, Grand Haven & Muskegon Railway Co., Grand Rapids, Mich.

Honolulu Rapid Transit Co., Honolulu, Hawaii

Houston Electric Co., Houston, Tex.

Illinois Power & Light Co., La Salle, Ill.

Illini Coach Co., Champaign, Ill.

Illinois Roadway Lines, Kankakee, Ill.

Imperial Stage Co., Seattle, Wash.

Interstate Busses Corp., Springfield, Mass.

Interstate Motor Transit Co., Portsmouth, Ohio

Interstate Stages, Inc., Detroit, Mich.

Interstate Transit Lines, Omaha, Neb.

Jefferson Highway Transportation Co., Minneapolis, Minn.

Jersey Central Transportation Co., Lakewood, N. J.

Kankakee, Joliet & Pontiac Bus &

Transfer Line, Kankakee, Ill.

London General Omnibus Co., London, England

Metropolitan Motor Coach Co., Chicago, Ill.

Modern Bus Co., Caldwell, N. J.

Motor Transportation Co. of the South, Savannah, Ga.

New England Transportation Co., Boston, Mass.

North East Transportation Co., Waterbury, Conn.

Northern Bus Co., Scranton, Pa.

Northern Ohio Power & Light Co., Akron, Ohio

Olean, Bradford & Salamanca Bus Line, Inc., Olean, N. Y.

Oregon-Washington Railroad &

Navigation Co., Pendleton, Ore.

Pacific Northwest Traction Co., Everett, Wash.

Peoples Motor Coach Co., Detroit, Mich.

Pittsfield, Barry & Quincy Busway, Inc., Quincy, Ill.

Plaza Tours Corp, Brooklyn, N. Y.

Rhode Island Transportation Co., Providence, R. I.

Public Service Transportation Co., Newark, N. J.

Royal Blue Lines, Richmond, Va.

San Diego Electric Railway Co., San Diego, Cal.

Scranton Bus Co., Scranton, Pa.

Shore Line Motor Coach Co., Gary, Ind.

Southern Pacific Motor Transportation Co., Portland, Ore.

Southland Transportation Co., Cincinnati, Ohio

Third Avenue Railway Co., New York City, N. Y.

Twin City Motor Bus Co., St. Paul, Minn.

West Virginia Transportation Co., Clarksburg, W. Va.

Wichita Motor Bus Co., Detroit, Mich.

Winnipeg & International Transit Corp., Fargo, N. D. Wisconsin Power & Light Co., Madison, Wis.

Worcester Consolidated Street

Railway Co., Worcester, Mass.

Yosemite Park & Curry Co., Merced, Cal.

25,000 miles in less than 23,000 minutes A Tribute to Long Clutches and Radiators



On November 3-4, at the Atlantic City Speedway, three stock model STUDEBAKER COMMANDERS established new A. A. A. world records for endurance and speed. Two Commander Roadsters each traveled 25,000 miles in 22,968 minutes; a Commander Sedan covered the distance in 24,200 minutes.

For 15 days, 22 hours and 48 minutes, at an average speed of better than a mile a minute, Long Clutches and Radiators (standard equipment on all Studebaker Commanders) played their part faultlessly.

LONG MANUFACTURING COMPANY DETROIT MICHIGAN



LONG PRODUCTS—AUTOMOTIVE CLUTCHES AND RADIATORS

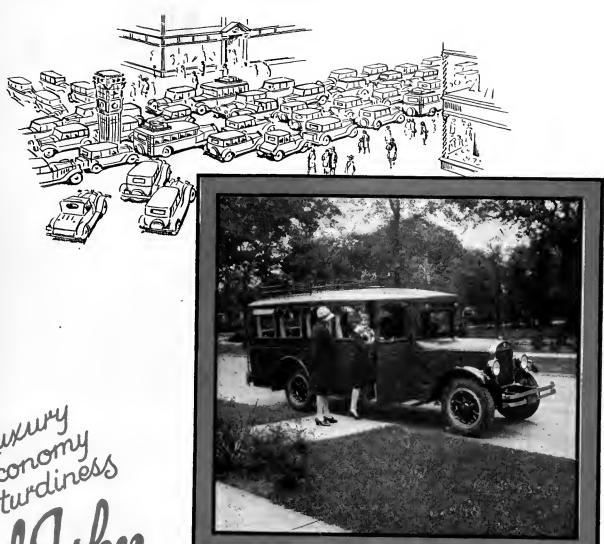
Willards bring 'em in on schedule



Extra strength in every part—accurate workmanship—and design that takes account of the hard knocks of the service fit this Willard for its job.

Extra-thick plates for more hours of lighting and more miles of useful life — heavy, flexible connectors that stand up under the racking of the roughest roads, and Threaded-Rubber Insulation that you can depend on to last the entire life of the plates—these are among the reasons why bus operators depend on Willard Batteries to start their busses out and bring them back on time. These are also the reasons why Willards will do a better job in the busses you build or operate.

Willard
Batteries



Luxury Economy Sturdiness

Hundreds of thousands of city dwellers daily goad their cars through heart-breaking traffic jams and tangles—pestered by stop signals—nagged by traffic

If you give them the kind of Bus service they want, they will be glad to ride with you. They will rejoice to get rid of the grinding mental strain, and within reason they won't quibble about your fare.

But, to tap this rich profit vein, you must furnish luxury, speed, few stops—you must approach private car comfort and convenience.

These requirements point right at the FITZJOHN, 12 passenger body, made for any good small chassis.

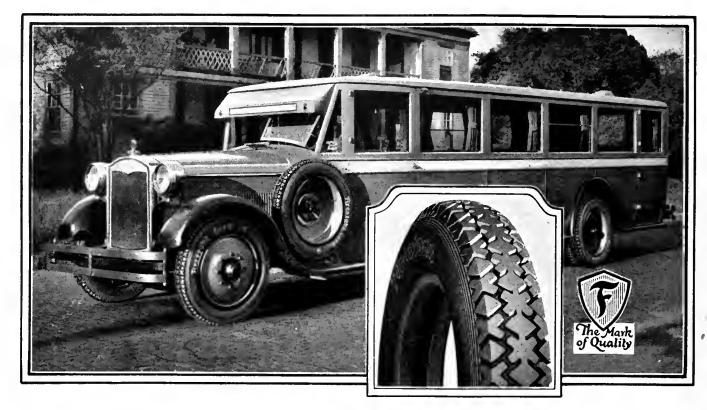
It is beautiful, luxurious, inside and outside, comfortable. Its smallness appeals because that means few stops.

Get the dope on FITZJOHN—it's the job for the purpose.

hey're Waiting for You

FITZJOHN MANUFACTURING **COMPANY**

Exclusive Bus Body Builders MUSKEGON, MICH.



All Motordom Endorses Fitestone GUM-DIPPED TIRES

All the scientific skill and creative ability of the world's largest organization devoted exclusively to tire building enter into the manufacture of Firestone Tires. Engineers, chemists, designers, and the thousands of stockholderemployees are pledged to maintain the Firestone ideal of "Most Miles per Dollar".

The Firestone Gum-Dipped Tire is their supreme achievement—recognized as the quality standard of the industry, the tire selected by so many of America's leading truck and bus manufacturers as factory equipment, and the choice of thousands of operators.

Firestone advanced the science of tire building many years by developing the special Gum-Dipping process. Every fiber of every

cord in Firestone Tires is saturated and insulated with rubber, minimizing friction and heat (arch-enemies of tire life) and adding many extra thousands of miles.

With world-wide facilities for controlling raw materials at the sources, and direct distribution only to regular tire dealers through 149 Factory Branches and Warehouses, Firestone eliminates middlemen's profits and assures fresh, clean tires to truck and bus fleets everywhere. Firestone Dealers—specially trained at Firestone Tire Repair Schools and Educational Meetings, and with modern facilities for better service—give operators valuable assistance in the securing of longer tire mileage and lower cost per mile.

MOST MILES PER DOLLAR

AMERICANS SHOULD PRODUCE THEIR OWN RUBBER . . Harney Spirestone

Waukesha-Powered Linn Tractors in Highway Service



a-771-LC

Gasoline Power FREES a Nation

Motor cars, buses and trucks have taken the city dweller, storekeeper and small manufacturer back to the country. Hand to mouth buying has made prompt package delivery by truck a necessity. Union school buses bring city education to rural dwellers. Cement highways provide a solid footing for motor vehicles until snow comes. Then progressive State Highway Departments come swiftly to the rescue with snow plow tractors, as shown above, and the country after a heavy snow now suffers even less inconvenience than the city.

The Linn Snow Fighters illustrated above, are used individually or in tandem for bucking snow drifts. They are here shown removing from two to four feet of hard, travel-packed snow. Such service requires the most rugged type of equipment, unusual power, and ability to aperate cantinuously in low temperatures and whenever snow storms make the demand. Sixplished 125 II. P. Waukesha Heavy-Duty "Ricardo Head" engines have been used for years in Linn Tractors. It is certain that engines which will stand the gaff behind a snow plow will give long, reliable and ecanomical service wherever they are used. Waukesha is proud of this contribution ta modern life.

A-801-T.C

AUTOMOTIVE EQUIPMENT DIVISION

WAUKESHA MOTOR COMPANY Waukesha Wisconsin

Eastern Sales Offices

Eight W. 40th Street

New York City

In the United States

Akron Bakersfield Bridgeton Camp Holabird Cedar City Cincionati Cleveland Coalinga Culver City Detroit Duchesne Fresno Graots Pass Green River Kansas City Los Aogeles Minneapolis Montreal New Brunswick New York Norfolk Oakland Omak Philadelphia Pittsburgh Plainfield Reno Ruby Santiago San Francisco Santa Barbara Spokane St. Louis Toledo Toronto Trenton Washington Wilmington Yahk

In the British Isles

Aldershot Ameabury Birmingham Blairgowrle Carlisle Cardiff Colyn Bay Dover Edinburgh Halifax Histon Huddersfield Leeds Liverpool London Morcambe Norwich Morwich Oldham Portsmouth Perth Reading Salford Sheffield

Wolver-Hampton



100% Adoption of Six Wheels

The recent Olympia Exhibition at London, England, showed EVERY IMPORTANT BRITISH MANUFACTURER—

23 in all—

Displaying a Rigid Six-Wheeler

The world-wide manufacture and use of Six-Wheelers is a glowing tribute to The LEADERSHIP of

·"SAFEWAY"



THE SAFEWAY SIX-WHEELER

THE SIX WHEEL COMPANY, 1800 W. LEHIGH AVENUE, PHILADELPHIA, PA.

Manufacturers of De Luxe, City, and Double Deck Type Six-Wheel Coaches



THE motor coach power plant has a tougher job now. Long winter nights increase the power plant load. Do you get the same steady power throughout the run? Can your midnight passengers read in comfort?

The many successful motor coaches running today provide riding comfort through well-placed lights and convenient accessories. This riding comfort must be maintained in order to maintain the satisfaction of the passengers. The power plant must be up to the job. If the power plant falls down, lights dim and business can lag.

... Make sure your midnight passengers find the same reading comfort as those who ride just after dark

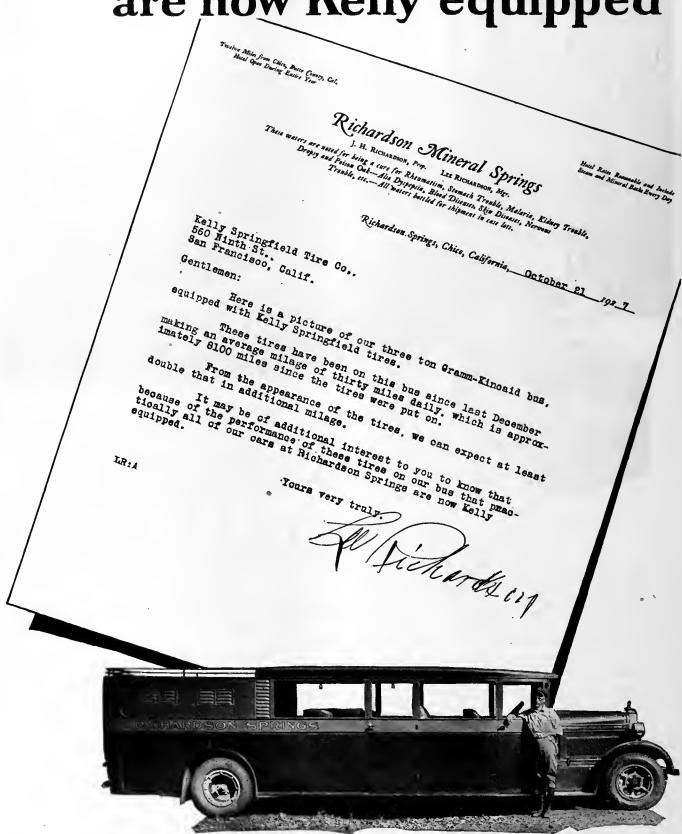
With a generator of the right capacity backed by a dependable battery, riding comfort is insured throughout the 24-hr. working day.

That's why thousands of motor coaches are equipped with the Exide Motor Coach Battery. This battery is designed expressly for its job, by engineers who know just how important that job is. And these coaches are well lighted. Their

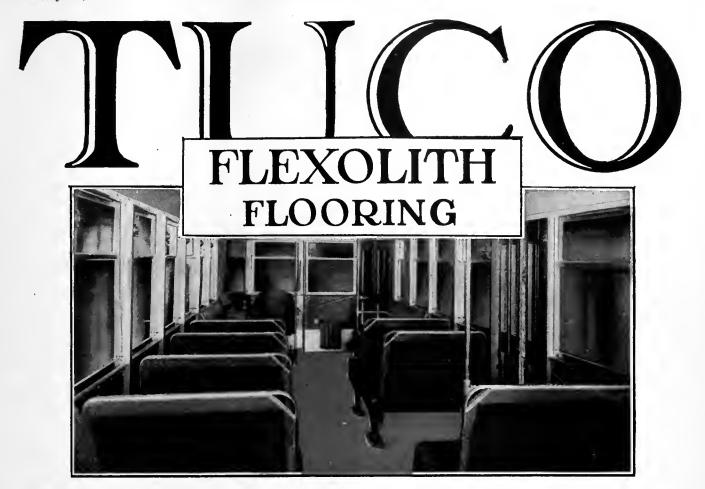
interiors are always bright. Their riding comfort is maintained at lowest operating cost per mile.

Exide MOTOR COACH BATTERY

"Practically all of our cars are now Kelly equipped"



KELLY-SPRINGFIELD TIRES



The Flooring used in all of the new buses ordered by the Third Avenue Railway Company

FLEXOLITH Special HWX Mixture is the flooring specified for all of the 104 new buses recently ordered by the Third Avenue Railway Company of New York.

The Third Avenue Railway Company has specified Flexolith because their past experience has proven that it is a permanent flooring with a non-

slip tread which requires no mats or coverings and because it is particularly attractive in appearance and is fireproof, sanitary and practically eliminates maintenance.

Used as standard flooring in motor buses and in railway cars of every type. We'll be glad to furnish details on request.

TUCO PRODUCTS CORPORATION

Executive Offices, 30 Church Street, NEW YORK

80 East Jackson Boulevard, CHICAGO, ILL.915 Olive Street, ST. LOUIS, MO.MONTREAL, CANADA ST. PAUL, MINN.

630 Louisiana Avenue, WASHINGTON, D. C. 751 Monadnock Building, SAN FRANCISCO, CAL. LOUISVILLE, KY. HOUSTON, TEXAS BOSTON, MASS.





What you want in bus tires you get in Goodyears

Experienced operators often say that all they want from their bus tires can be summed up in one requirement:

Uninterrupted revenue miles!

Every quality of tire construction and design, they point out, should play its proper part in producing this essential result.

Freedom from trouble on the road—

Tractive power for starting and stopping—

A safe, sure, anti-skid grip on any surface—

The inbuilt strength to stand up for thousands of miles at low tire mile cost—

All these bear directly on that prime essential of Uninterrupted Revenue Miles.

Because they meet this supreme requirement more completely than any others, Goodyear Pneumatic Cord Bus Tires are greatly preferred.

Their great durability, proved under every operating condition, results from their casing construction of SUPER-TWIST. This extra-elastic, extra-durable cord fabric flexes easily, yielding and recovering with the inequalities of the road, preventing bruises and eliminating shoulder breaks. Fewer carcass failures and fewer tire changes on the road are the result.

This same SUPERTWIST resilience is also the secret of the easy riding comfort provided by Goodyear Tires—the extra cushioning reflected in both lower vehicle repair bills and greater passenger satisfaction.

Coupled with these body qualities are the distinct advantages of the Goodyear ALL-WEATHER TREAD.

The sharp diamond-shaped blocks of this famous tread offer the greatest spread of gripping surface to the road at all times.

They cut away the slippery film on damp pavements—they dig deep into snow or mud—they seize and grip, to go ahead with mighty power or to come to a skidless stop.

Goodyear Pneumatic Bus Tires, made with SUPERTWIST and the ALL-WEATHER TREAD, are powerful, dependable, comfortable and safe. They give high mileage at low tire mile cost. They are products worthy of "The Greatest Name in Rubber."

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service







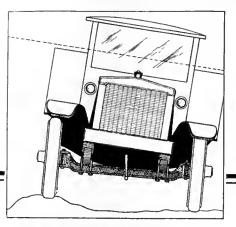


Figure 1, illustrating how chassis of truck not equipped with air springs, is wrenched and twisted.

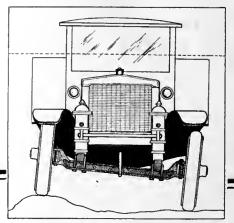


Figure 2, illustrating how air springs absorb the uneven road conditions and prevent wrenching and twisting of frame

In Winter, Particularly Buses Need This Protection

Against Road Shocks and Vibration

THESE winter months are hard on buses. Frozen ruts and snow-piled roads make road conditions doubly brutal.

Protect your buses from these destructive shocks and the resultant vibration by equipping them with Gruss Air Springs.

Note the illustrations above. See how the Gruss air cushions absorb uneven road conditions and keep the chassis level. Mark how Gruss Air Springs protect the regular steel springs against the punishment they otherwise must undergo. Think of the maintenance saving you can effect by preventing steel spring breakage, alone.

Consider, too, the other benefits that air springs bring: Supreme riding comfort regardless of road conditions; maintenance of regular schedules—a score of other profit paying results.

You need Gruss Air Springs now. Write for complete details.

THE CLEVELAND PNEUMATIC TOOL CO. Cleveland, Ohio

GRUSS AIR SPRINGS

for Trucks, Buses Passenger Cars ~_





Model 15 (Street-car type) by International Harvester

One of Three Popular Styles

HE coach operator of today lays his plans with an eye to maximum activity with conservative investment. He wants economy coaches for medium loads, designed inside and out to please the fastidious rider, and scheduled to run with the dependable frequency that establishes routes with the public.

He finds on investigation that the coach he prefers is such a coach as

International Harvester builds and services. International Harvester pioneered in the development of motor coaches and the popular Model 15 is the fruit of that experience. Furnished in three styles—the Street-Car type [shown above], the Club Coach, and the Sedan Coach. To carry 15 to 17 passengers—the ideal capacity. Write for the Motor Coach Catalog.

INTERNATIONAL HARVESTER COMPANY

606 So. Michigan Ave.

OF AMERICA

Chicago, Illinois

The International Harvester automotive line also includes Speed Trucks of 1¼, 1½ and 2-ton, Heavy-Duty Trucks up to 5-ton, and McCormick-Deering Industrial Tractors.



Serviced through 160 Company-owned branches in the United States and Canada, and through many dealers. Service unexcelled — service always "around the corner."

INTERNATIONAL HARVESTER SIX-CYLINDER COACHES

THE NATIONAL CASH REGISTER COMPANY

ANNOUNCES

A New Fare Recording Register

Making possible a greatly improved method of fare collection

A long period of research and development on the part of our engineering and inventions departments has resulted in this new machine. It has been thoroughly tested in the field under the most trying conditions. It embodies the ideas and suggestions gained from a broad contact with transportation men and a careful study of their problems.

Among its advantages are:

Faster operating schedule.

Uniform system for all stations.

Low cost of tickets.

Instant printed totals of fares collected.

Passengers cannot exceed distance paid for unless additional fare is collected.

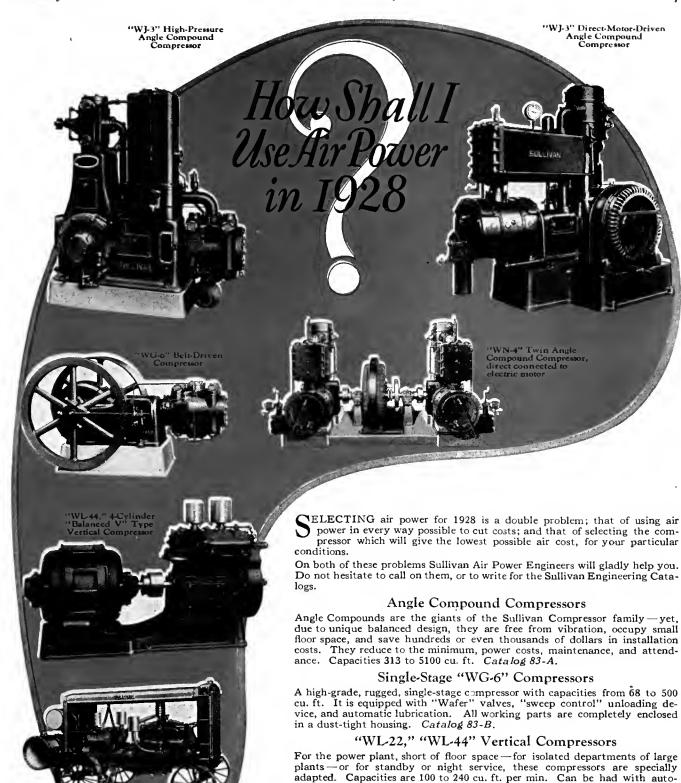
Small, compact, built to stand rough usage.

Large range of stations and fares on one register.

Insures the greatest protection, information and economy.

A wire or letter to the factory at Dayton will bring complete information about this new fare-recording register.

THE NATIONAL CASH REGISTER COMPANY DAYTON, OHIO



WK-314," 310 ft. Portable Compresso

ortable Compressor on Steel Wheels

matic start and stop control.

Portable Compressors For construction or repair work about the plant, Sullivan Portable Compressors are available in a wide range of capacities from 103 cu. ft. to 310.

You can have them with electric motor drive, or Buda gasoline engine; on steel wheels, rubber-tired trailer trucks, or skids. Catalog 83-F.

SULLIVAN MACHINERY COMPANY 150 S. MICHIGAN AVE. CHICAGO

Dallas

San Francisco Salt Lake City Spokane Duluth



They are as important as Modern Cars!

Passenger comforts, speed and good public relations depend to a great extent, of course, on the modern car. But they are also dependent upon your overhead system!

No matter how modern your equipment may be, the anticipated result cannot fully materialize if your overhead lines are in poor condition!

Give your overhead lines the attention they deserve. Make this your big objective in 1928. Let Anderson, Engineers and Anderson Line Material help you.

More than forty years of specialized experience backs this organization, in rendering prompt and efficient service to the electric railway industry.

Send for the
ANDERSON
No. 39
With hundred descriptions catalog railway service.

Albert & J. M. Anderson Mfg. Co. 289-305 A St., Boston, Mass.

Experience Experience idsit buildsit

Experience buysit

Successful Operators Power, Speed, Safety,



\$4045 12-Passenger Parlor Coach (f. o. b. Detroit) \$4060 21-Passenger Street Car Type (f. o. b. Detroit)

\$4290 16-Passenger Parlor Coach (f. o. b. Detroit)

GRAHAM MOTOR

SOLD BY DODGE BROTHERS

Capitalize its Size, Comfortand Appearance

Graham Brothers 21-Passenger Street Car Type Motor Coach is built and bought by men who know well the business of transporting people

The experienced care which goes into the design and construction of Graham Brothers motor coaches warrants their purchase by experienced operators. And seasoned operators, in increasing numbers, are buying them.

Dependability, economy and stamina are not merely claims made for these coaches. They are facts built upon the consistent performance of these coaches in service. 6 cylinder engines 4 speed transmissions 4 wheel brakes (Lockheed hydraulic) 3 stage progressive type springs Operators continue to say of Graham Brothers coaches—"everything a motor coach should be or have."

Such high quality at so low a price is possible only with great volume production.

BROTHERS COACHES

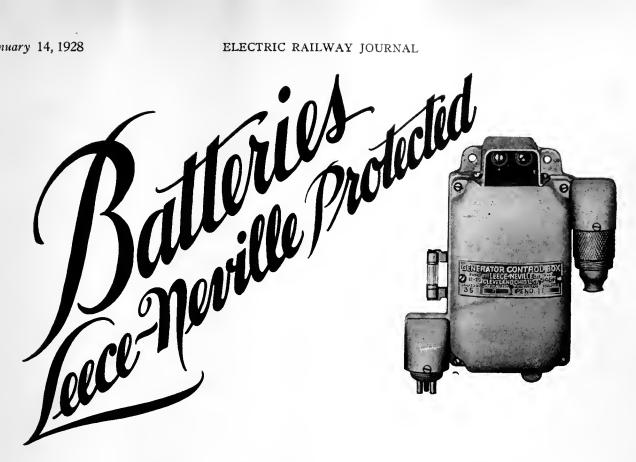
EALERS EVERYWHERE

—and one of your reputable local business men sells the complete coach, services it, keeps readily available an adequate stock of repair parts

GRAHAM BROTHERS

EVANSVILLE -DETROIT - STOCKTON

A DIVISION OF DODGE BROTHERS, INC
GRAHAM BROTHERS (CANADA) LIMITED. TORONTO. ONTARIO



Batteries protected by Leece-Neville Patented Voltage Regulators soak up work like a sponge does water. It's not unusual for coaches so equipped to run 125,000 miles without any battery repair.

Such service results from batteries being properly charged at all times-overcharge is impossible. A correct charging rate means there's always a "Kick" in the battery to start the motor, and even

flow of current means steady lights.

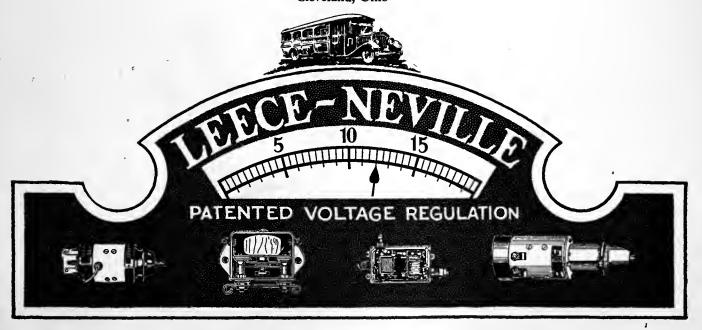
But best of all it means virtually no interruptions to service, and a maintenance cost that is practically negligible.

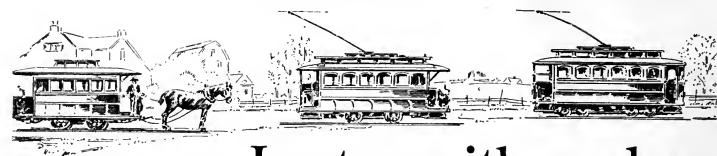
On better motor coaches Leece-Neville Patented Voltage Regulation is standard. That tells the story.

Specify Leece-Neville voltage regulation on your next order for motor coaches.

The Leece-Neville Co.

5353 Hamilton Ave., Cleveland, Ohio





In step with modern



Tremendous strides have brought transportation out of the era of crude, uncomfortable cars to that of the modern electric car and its ally the bus.

Particularly within the past five years, this progress has converted previously inadequate facilities into real service possessing distinct rider appeal.

For more than fifty years Hale & Kilburn have kept in step with transportation progress—always

No. 900-D—double rotating chair in combination plush and leather with deep individual seat cushions and divided back. For double-end interurban cars.

No. 900-D-double chair without arm rest. For city type cars.

No. 392-A—double Walkover seat with divided spring edge back and double deck spring edge cushion. For city service.

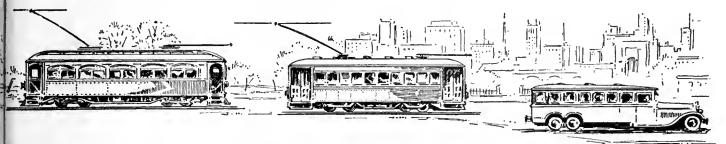
No. 392-A—double Walkover seat with plain spring back and double deck spring edge cushion. For city type cars.

No. 392-EE—finest type Walkover seat with extra high three part headroll. For interurban service.

No. 900-D—double stationary chair in combination plush and leather with deep individual seat cushions and divided back. For buses and single-end interurban cars.



For utmost comfort in every type of service—



transportation progress—

guiding and leading the way toward better transportation by means of more comfortable and more practical seats and chairs.

Today, Hale & Kilburn's latest models are the last word in comfort, appearance and space-saving features.

One of our representatives will be glad to consult with you at any time.

Ask for the H & K Catalog to get complete descriptions of our many types for every kind of service.

HALE & KILBURN COMPANY

General Offices and Works:

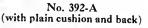
1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York Hals & Kilburn Co., McCormick Bldg., Chicago E. A. Thornwell, Candler Bldg., Atlanta Frank F. Bodlar, 903 Monadnock Bldg., San Francisco

T. C. Coleman & Son, Starks Bldg., Louisville W. L. Jefferies, Jr., Mutual Bldg., Richmond W. D. Jenkins, Practorian Bldg., Dallas, Texas H. M. Euler, 146 N. Sixth St., Portland, Oregon C. S. Wright Co., 66 Temperance St., Toronto, Ont., Canada.









Hale and SEATS Kilburn SEATS

ALUMINUM

AND ITS ALLOYS IN EVERY COMMERCIAL FORM

A.C.S.R.

as Catenary Messenger

Aluminum cable, with a core of stranded high-strength steel wires, combines the functions of Messenger and Feeder most economically. It is non-corrodible, and at the same time has the mechanical advantage of high-grade steel.

The minimums of supported weight and resulting stresses are obtained by the use of aluminum conductors and fittings.

ALUMINUM BUSBAR

Busbar
Conduit
Castings
Strong Alloys
Hand-rail Tubing
Powder for Paint
Structural Shapes
Cable, Steel Reinforced

Have you read our illustrated booklet giving information required by designing engineers? It is sent to engineers and executives free on request; ask for "Aluminum Busbars."

ALUMINUM COMPANY of AMERICA

2301 Oliver Bldg., PITTSBURGH, PA.

Offices in 18 Principal Cities

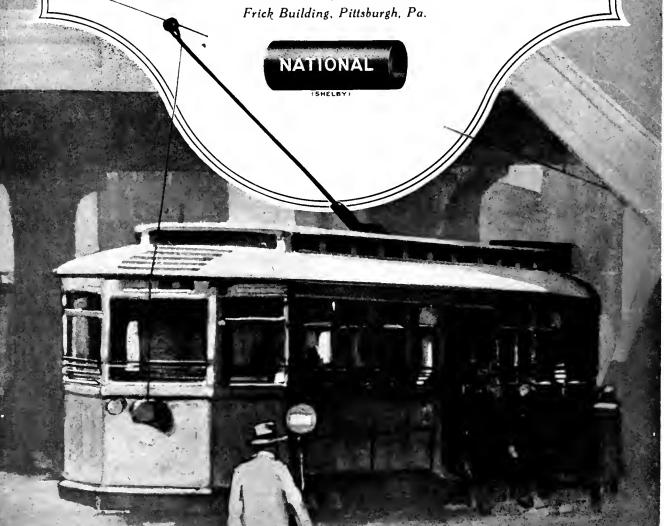


Cutting the Cost of Trolley Pole Service

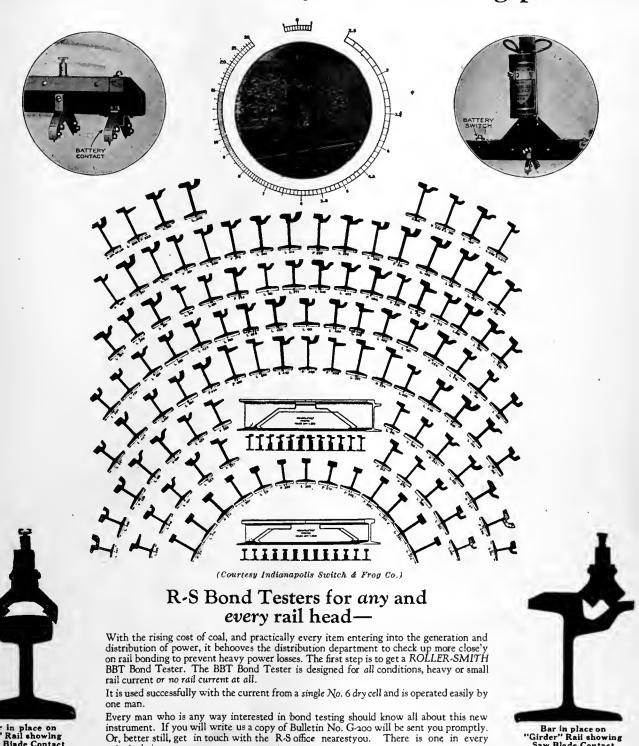
THE actual cost of trolley pole service is not confined to the purchase price of the pole itself. What the pole can do from day to day to keep down delays, avoid traffic tie-ups and eliminate frequent repairs or replacement of poles—are factors that determine the ultimate cost of trolley pole service.

"NATIONAL-SHELBY" Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service. In addition, every "NATIONAL-SHELBY" Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.





The ROLLER-SMITH BBT Bond Tester and Contact Bar solve every bond testing problem



Bar in place on "T" Rail showing Saw Biade Contact

"Over thirty years' experience is back of ROLLER-SMITH"

Electrical Measuring and Protective Apparatus

Main Office:

Works:

2140 Woolworth Bldg., NEW YORK

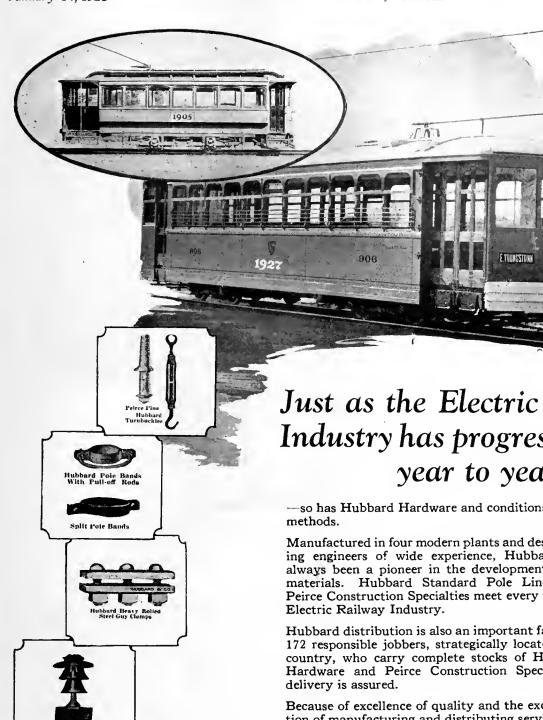
Bethlehem, Penna.

principal city.

Bar in place on "Girder" Rail showing Saw Blade Contact



Stackpole carbon brushes



Just as the Electric Railway Industry has progressed from year to year-

-so has Hubbard Hardware and conditions in manufacturing

Manufactured in four modern plants and designed by specializing engineers of wide experience, Hubbard Hardware has always been a pioneer in the development of new pole line materials. Hubbard Standard Pole Line Hardware, and Peirce Construction Specialties meet every requirement of the

Hubbard distribution is also an important factor! Handled by 172 responsible jobbers, strategically located throughout the country, who carry complete stocks of Hubbard Pole Line Hardware and Peirce Construction Specialties, immediate

Because of excellence of quality and the exceptional combination of manufacturing and distributing service, Hubbard leads the list for the most complete and modern equipment.

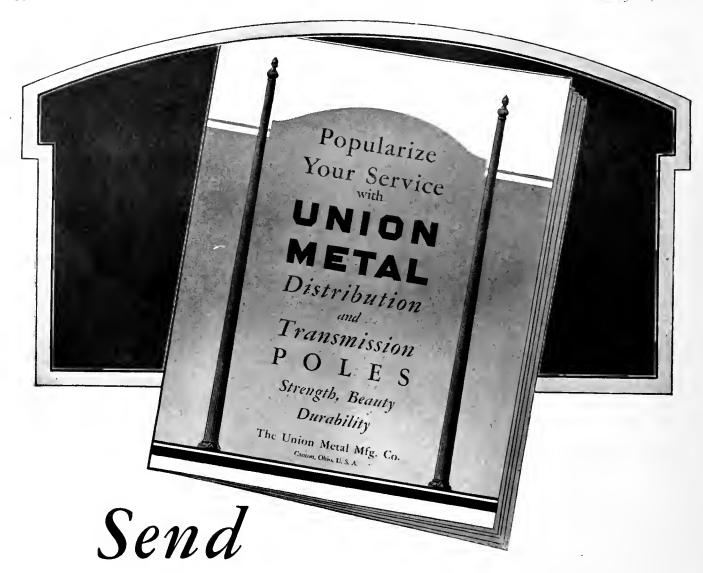
The pole line hardware and construction specialties buying guide of the Electric Railways is the new Hubbard Catalog No. 28.

Write for your copy today.

The HARDWARE makes the line Hubbard makes the HARDWARE

and COMPANY

PITTSBURGH OAKLAND, CAL. CHICAGO



For Your Copy

THE new catalog giving complete information regarding Union Metal Distribution and Transmission Poles is just off the press. In it you will find a full description of this revolutionary advance in pole manufacture.

If you are interested in poles with new strength, beauty and durability, send for

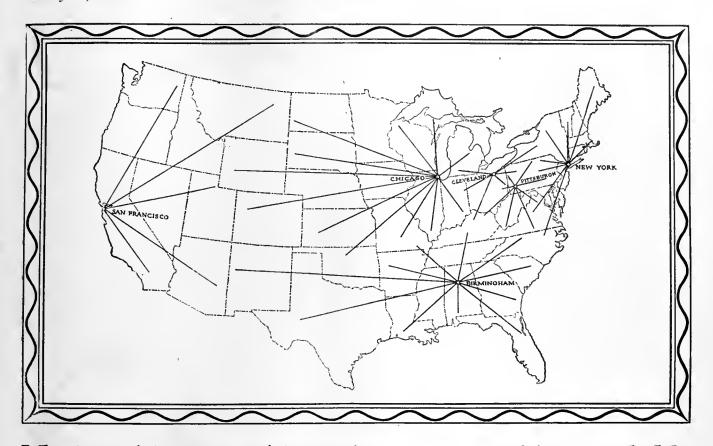
your copy of this catalog. Here will be found the answer to many vexing problems—particularly those relating to public good will and an economical means of developing this good will.

Let us give you the complete Union Metal story before you place your order for additional poles.

THE UNION METAL MANUFACTURING COMPANY

General Offices and Factory, Canton, Ohio Branches—New York, Chicago, Philadelphia, Cleveland, Pittsburgh, St. Louis, Los Angeles, San Francisco, Jacksonville.

UNION METAL DISTRIBUTION AND TRANSMISSION POLES



National Pyramid Brushes are quickly available to industrial America

UNDOUBTEDLY the NCC Brush Service Plants form a system whose service is one of the most appreciated facilities of modern industry. These plants are ever ready to provide, with the utmost speed, accurately made brushes to the power plants and workshops of the nation. In emergencies, due to accidents or other causes, we have at times been able to make shipment so quickly as to save brush users thousands of dollars that otherwise would have been lost through tieups. To take best advantage of the facilities offered by these carefully located plants, it is advisable to have on file in the Emergency Service Plant nearest you a complete record

of your brush requirements, in our Data Sheet System. This system we install without cost or obligation to you. It enables you to order brushes by wire or phone, giving us only the Data Sheet item number of the machine or machines for which brushes are needed. This system is relied upon by many of our customers to simplify brush orders and to enable us to produce brushes with the greatest speed.

Let us tell you more about the service you can expect from our main plant in Cleveland, and from the following Emergency Service Plants in these other industrial centers:

CHICAGO, ILL. 551 West Monroe St. Phone: State 6092

PITTSBURGH, PA. Arrott Power Bldg. No 3, Barker Place Phone: Atlantic 3570

NEW YORK, N. Y. 357 West 36th St. Phone: Lackawanna 8153

SAN FRANCISCO, CALIF. 599 Eighth St. Phone: Park 8800

BIRMINGHAM, ALA. 1824 Ninth Ave., N. Phone: 3-6091



NATIONAL CARBON COMPANY, INC.

Cleveland



San Francisco

Unit of Union Carbide and Carbon Corporation





st as the years roll by

So do car parts wear out!

We do not claim that we can retard the progress of time itself! But we do claim that Boyerized Car Parts see three or four times as many years roll by as do ordinary steel parts!

Performance records of *Boyerized* Car Parts on the cars of hundreds of electric railways establish conclusively that they have a life equal to three or four times that of ordinary steel parts!

Maintenance costs do not worry the Boyerized railways. They know that to Boyerize is to economize.

Yet the cost of *Boyerized* Car Parts is not even twice that of ordinary steel parts. You don't need statistics to prove so obvious a saving.

Be your own judge. Boyerize one or more cars for a test. We know that as a result your name will be among the many added to our long list of standardized Boyerized railways!

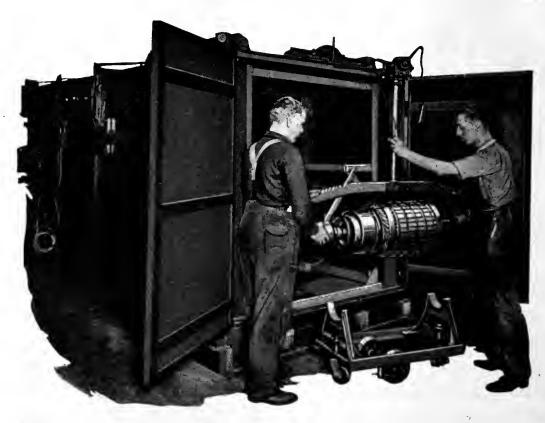
Bemis Car Truck Company

Electric Railway Supplies SPRINGFIELD, MASS.

REPRESENTATIVES:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill. F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. W. F. McKenney, 54 First Street, Portland, Oregon, J. H. Denton, 1328 Broadway, New York City, N. Y. A. W. Arlin, 519 Delta Building, Los Angeles, Cal.





"IRVINGTON" INSULATING PAINTS

are guaranteed to be—UNIFORM—in every shipment and used under the same conditions will produce uniform products.

Uniformity of Specific Gravity
Viscosity
Drying Time Produces
Per Cent Solids
Dried Film Thickness

Specific Gravity
Viscosity
Produces
Better Application Control
Better Flowing Control
Better Air Drying Control
Better Covering
Better Insulation

"Irvington" Black Insulating Paints are recommended for brushing or spraying in the painting of connections, iron or wood fittings, junction and cut out boxes, car trucks and under bodies, and for general moisture and acid protection purposes. They adhere firmly to iron or wood, are unaffected by temperature changes and give the best protection from decay and rust and

prevent the absorbtion of moisture. They are also highly recommended for accumulator and storage battery work, battery racks and trays, and battery boxes.

No. 14 is a general all round paint while No. 15 is to be preferred where the coating should have a reasonable amount of alkali proofness as well as acid proofness.

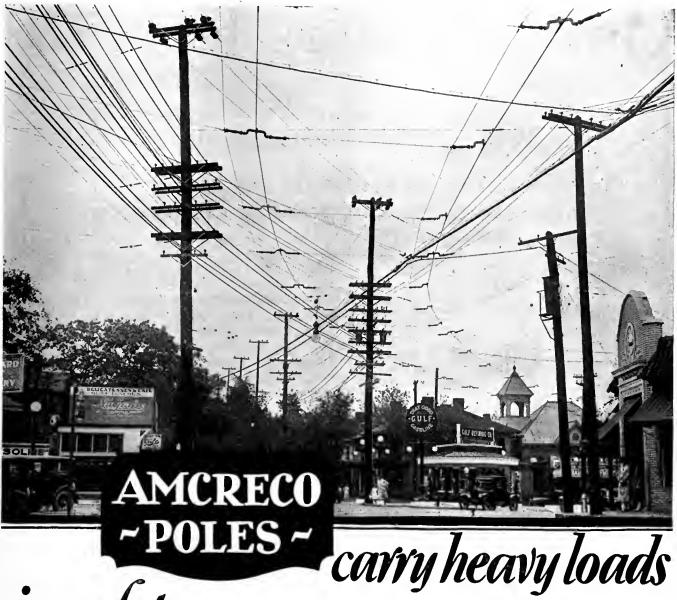
No. 14 Black		No. 15 Black
Insulating Paint.	Constants	Insulating Paint.
.869 to .875	Specific Gravity	.838 to .843
45 minutes	Air Drying Time	30 minutes
.004 to .005	Drying Film Thickness	.004 to .005

IRVINGTON VARNISH & INSULATOR C. Irvington, New Jersey.

Charles E. Chapin, New York White Supply Co., St. Louis E. M. Wolcott, Rochester Martin Woodard, Seattle Electric Insulation Co., Philadelphia

Established 1905
INSULATING VARNISH
Soles Representatives

Prehler Bros., Inc., Chicago Consumers Rubber Co., Cleveland Clapp & LaMoree, Los Angeles A. L. Gillies, Toronto



in safety

STRENGTH is an outstanding characteristic of Amcreco Creosoted Pine Poles. The Department of Agriculture rates pine 44% stronger than the next strongest species and the Forest Products Laboratory verifies this conclusion.

Amcreco poles are not only strong when new. They are so perfectly protected from decay that their strength is unimpaired after long years of service.

For heavy duty lines you need strong poles. You can depend on Amcreco. They have the added strength that enables them to meet the severest test.

SALES OFFICES
332 So. Michigan Ave.
Chicago
350 Madison Ave.
New York City

New York City 401 W. Main St. Louisville, Ky. Brunswick, Ga. Bogalusa, La.

AMERICAN CREOSOTING COMPANY

COLONIAL
CREOSOTING
GOMPANY



GEORGIA
GREOSOTING
GOMPANY

ERJ1-14-Gray

Ohmer Offers for 1928

A comprehensive line of Indicating and Recording Fare Registers, Ticket Printing Registers, Mileage Recording Instruments and Fare Boxes.

Here Are Some of Them

Ohmer Indicating and Recording Fare Registers

	•	O O	
No. 19 Type		Capacity, one class of fare	
No. 15 Type		Capacity, two classes of fares	
		Capacity, three classes of fares	
		. Capacity, four to six classes of f	fares
No. 4 Type		. Capacity, twelve classes of fares	3
		. Capacity, fourteen classes of far	
		. Capacity, forty classes of fares	
		. Capacity, sixty classes of fares	
No. 75 Type		Prints detail record of each	fare
J 1		ranging from one cent to \$9.99:	Also
		prints totals.	

Ohmer Ticket Printing Registers

Print and Issue Tickets and Print Detail Records

79-O	To record up to	9 zones	\$.99
		99 zones	
79-B	To record up to	999 zones	9.99
79-C	To record up to	999 zones	99.99
		for either electrical or manual operati	
with c	apacity for printi	ng as many as 2,500 tickets from each	ticke t
roll.			

Ohmer Fare Boxes

		For coins up to and including quarters. Extra large cash container, otherwise same as
101-B	Size 18x6x6	101-A. For tickets and coins of all denominations.
101-BC	Size 24x6x6	Extra large container, otherwise same as 101-BC.

Ohmer Mileage Recording Instruments

The Ohmer Hub-Odometer—Made to fit hub of any vehicle.

The Ohmer Odometer. For railway cars or motor vehicles operated from transmission or axle.

The Ohmer Recordograf—Produces graph record of all movements of a vehicle including mileage, speed, stops and time.

We also manufacture various types of taximeters as well as a complete line of counting machines. Write us for full details of the particular instrument in which you are interested

Ohmer Fare Register Company Dayton, Ohio, U. S. A.

head lighting for the motor coach starts with selection of the head lamp

वनरागरे



Besides building headlamps which meet the requirements of modern driving conditions, Guide offers a quality line of stop-tail lamps, dome lamps and marker lamps—every lighting need of the up-to-date motor vehicle.

GUIDE Dome Lamps

The two models of Guide Dome Lamps shown here are very popular with bus companies. They are ornamental, artistic in style and furnish excellent indirect lighting for the comfort of passengers.





GUIDE Stop-Tail Lamps

These combination stop-tail lamps are used both as tail lamp and as a warning when the operator applies his brakes. The Guide stop-light switch, used with these lamps, is of the latest approved design.





GUIDE Marker Lamps

Besides those shown below, Guide makes many other styles of marker lamps, all of high quality construction and design, to operate efficiently on all types of coaches.







Efficient headlighting, plus the ability to stand up under the most severe service conditions, has earned for Guide Motor Coach and Truck Headlamps a most enviable reputation among fleet operators. Occasionally costing more initially than ordinary equipment, they pay back in long life and low cost upkeep. Make sure you have a catalog.

The Guide Motor Lamp Manufacturing Company. Cleveland, Ohio.

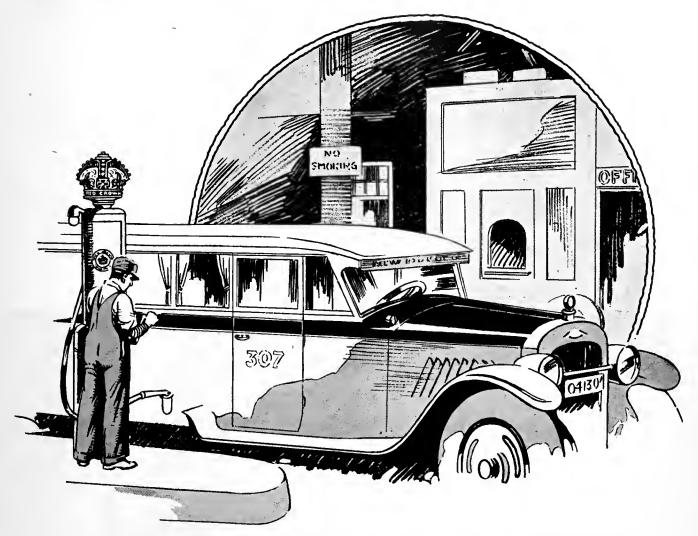


LONG BEAM FOR THE OPEN ROAD TILTED FOR CITY DRIVING & PASSING

Out on the open road the long range beam of Guide Tilt Ray Headlamps furnishes the kind of driving light necessary—and plenty of it. (As you approach traffic a mere touch of the switch lever or button shortens and tilts the beam of light directly in front for safe passing. (Two lights in one. Always under control, without removing hands from the steering wheel. (So safe and comfortable have Tilt Rays made night driving, it is small wonder they are to be found as original equipment on the finest automobiles, trucks, and motor coaches. The Guide Motor Lamp Manufacturing Company, Cleveland, Ohio.

Guide TILT RAY HEAD LAMPS





Do Your Buses Come in On Time!

Maintaining schedules during the winter months becomes a problem for all operators of Motor Bus fleets. Cold weather, slippery highways, snow-drifted roads and other obstacles all work to delay the movements

of the passenger bus. Such conditions cannot be overcome. But you can insure the perfect operation of the monster "power plants" in your equipment by using, at all times

Red Crown Gasoline

This superior motor fuel enables the bus engine to do its best, regardless of weather or road conditions.

Red Crown Gasoline starts the engine quickly, allows it to accelerate smoothly—rapidly. And because every drop of this famous fuel is converted into a steady stream of power, the engine "digs down" and pulls for all it's worth. Tremendous pulling power is absolutely essential to

overcome the handicaps of winter driving.

We should like to demonstrate the superiority of this dependable, quality proved gasoline in one or all of your buses. An expert, at your request, will conduct the test at no cost or obligation to you. Just phone or write our nearest branch office. We will send a man to prove that Red Crown Gasoline will help bring your buses in on time through the snow, sleet and cold of winter.

STANDARD OIL COMPANY

(INDIANA)

General Offices: 910.S. Michigan Ave., Chicago, Illinois



over or rough-turned on journals and wheel seats.

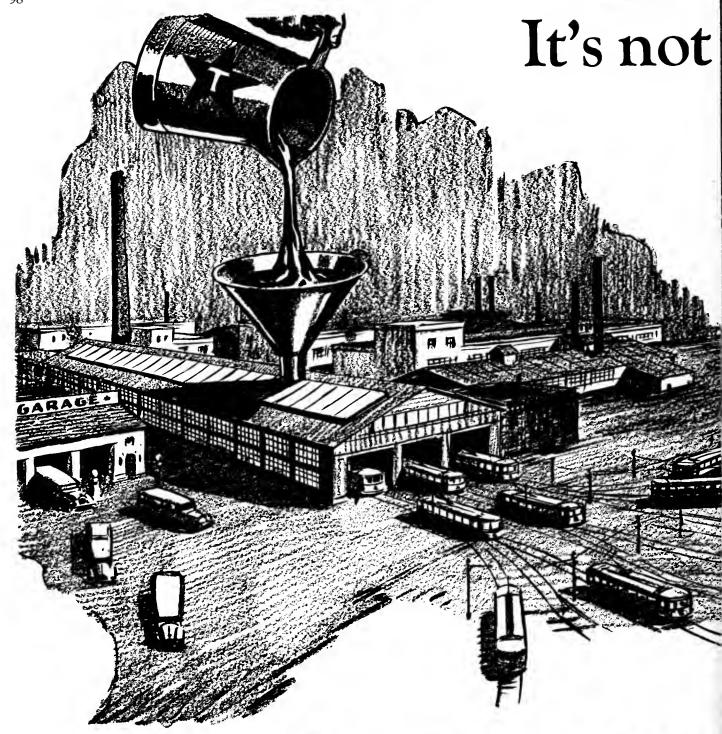


BETHLEHEM STEEL COMPANY — BETHLEHEM, PA. District Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Buffalo Pittsburgh Cincinnati Chicago Cleveland Detroit St. Louis San Francisco Los Angeles Seattle Portland

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products,

BETHLEHEM





EX

THE TEXAS COMPANY,

OFFICES IN

how much—but how well you lubricate!

HE lubricants you are using should be reflected in savings in total operating expenses.

Do your lubrication statistics show that you are decreasing renewals of journal brasses,—axle and armature bearings—fewer armatures down on the pole pieces—fewer rings in compressor pistons or pinions on the motors? Do they show a reduced number of "pull-ins?" Do they show you are getting the most mileage out of your buses between overhaul periods?

You do if you are using TEXACO lubricants.

The reduction or elimination of costly failures is far more important than the lubrication costs themselves.

Getting the right kind of lubrication to produce such savings in maintenance costs does not mean, necessarily, that the cost of lubricants should be increased. By selecting TEXACO lubricants this cost may even be lowered and the savings in maintenance costs secured at the same time!

Why not follow the practice of many of the largest and most successful electric railways and bus operators? Have a fully qualified TEXACO engineer make a survey of your system!

His recommendations will provide for lubrication with oils and greases of known quality. He will suggest the right kind and quantities to use, the best methods of application and further, if desired, will instruct your maintenance force in the most convenient and practical methods of getting effective results. You will be under no obligation.





—a comfortable ride is the best method of securing passenger satisfaction.

An essential to a comfortable ride is a smooth, well-built track. Without it, even the finest rolling equipment is of little use. A rough track will not only offset the advantages of splendid equipment, but will hasten it to a premature discard.

Carnegie Steel Cross Ties, properly laid, insure a smooth, repair-free track. They do their share toward securing passenger satisfaction. And when considered on a unit-cost basis (cost per mile per year) Carnegie Ties are cheaper than wood.

May we send literature—or would you prefer that representative call?

CARNEGIE STEEL COMPANY

General Offices • Carnegie Building • 434 Fifth Avenue
PITTSBURGH PENNSYLVANIA

PIN TERMINAL RAIL BONDS



View of 20th Century rounding bend at Marblehead. The New York Central is always among the leaders in modern equipment. Insert shows our type CPO1 Bond used on all main line tracks

BECAUSE of the ease of installation, Pin Terminal Rail Bonds are used on many of the larger railway systems. They are accessible for inspection, show low maintenance cost, insure strong contact and low resistance.

The American Steel and Wire Company has a rail bond for every requirement. Our engineers will be glad to assist you in selecting the best bond for your needs.

American Steel & Wire

Sales Offices:

Company

CHICAGO, NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADELPHIA, PITTSBURGH, BUFFALO, DETROIT, CINCINNATI, BALTIMORE, WILKES-BARRE, ST. LOUIS, KANSAS CITY, ST. PAUL, OKLAHOMA CITY, BIRMINOHAM, MEMPHIS, DALLAS, ATLANTA, DENVER, SALT LAKE CITY EXPORT REPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK

PACIFIC COAST REPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LGS ANGELES, PORTLAND, SEATTLE.

The corner has been turned...

MEN who move around in electric railway circles have noticed the change. There's a spirit of confidence and optimism in the air. When the leaders speak they say that the corner has been turned—and they have behind them the evidence of an ever-increasing number of successful and profitable modernizations.

Looking closer into this new and brightened picture we see the vital details that give it form. We see new cars, improved schedules, better track and maintenance facilities. And we notice, particularly, that those properties whose names stand highest in the new day honor roll have paid close attention to the modernization of their overhead trolley and transmission systems.

Some have used Anaconda Wire Products and some have not. But we submit that you could hardly do better than place responsibility for your own modernized overhead systems in the hands of the largest and most complete copper-producing organization in the world. Six wire mills, strategically located from coast to coast, offer you a service unmatched for promptness and dependability.



TROLLEY WIRE

Hitenso C (High Strength Bronze) Hitenso A (Medium Strength Bronze)

Anaconda Tin Bronze
(High and Medium Strength)

Anaconda Hard Drawn Copper

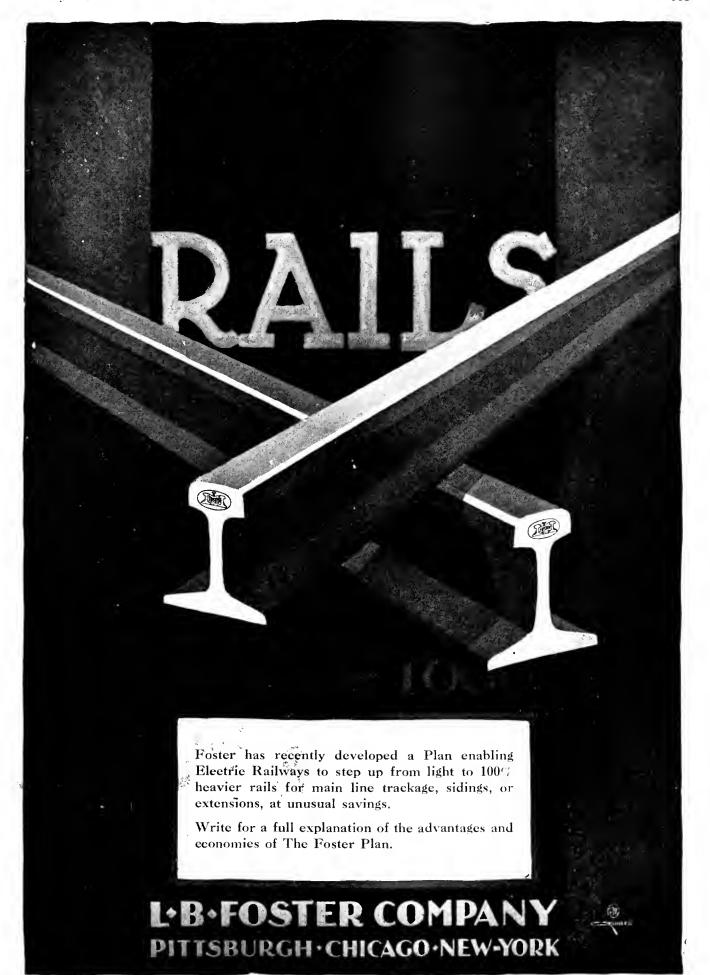
COPPERWIRE AND CABLE

Bare and Weatherproof
Messenger and Guy Wire
Lead Sheathed Cable
Paper Insulated
Varnished Cambric Cable
Lead Sheathed or Braid Covered

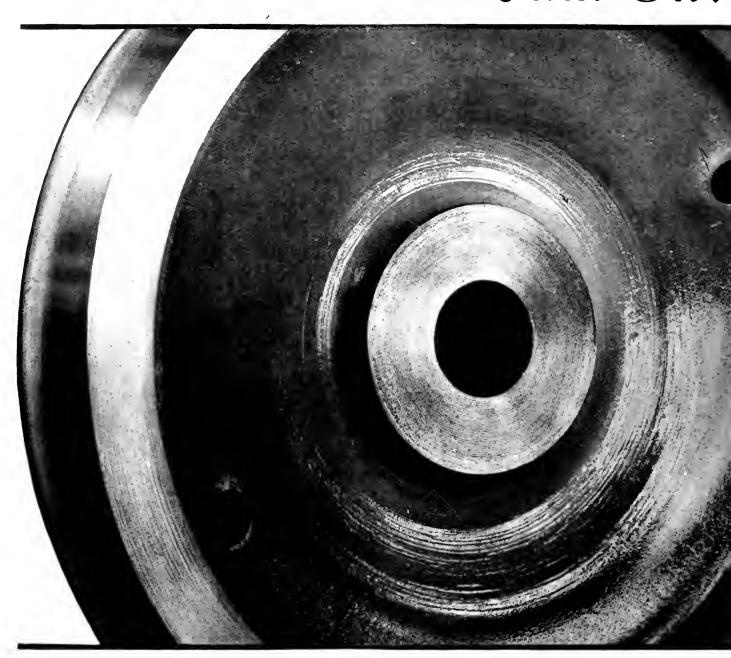
ANACONDA COPPER MINING COMPANY THE AMERICAN BRASS COMPANY

Rod, Wire and Cable Products
General Offices: 25 Broadway, New York
Chicago Office: 111 W. Washington Street.

ANACONDA TROLLEY WIRE



When The Brakes Jam On!



WROUGHT STEEL WHEELS

STEEL AXLES

- How About Your Wheels?

MODERN schedules and traffic requirements demand quick action on stops and get-aways. This imposes severe punishment on wheels and axles.

"Standard" wheels and axles are chosen for the finest and fastest modern cars. They stand the grind of heavy traffic.



STANDARD

STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES: HOUSTON

PORTLAND RICHMOND MEXICO CITY SAN FRANCISCO ST. PAUL PITTSBURGH

WORKS: BURNHAM, PA.

ARMATURE SHAFTS

CHICAGO ST. LOUIS NEW YORK

> STEEL SPRINGS

Canned Experience Make use of the other man's experience

That old saying

That old saying about experience being the best teacher is absolutely sound in one sense. But most of us recite it without thinking that experience may be of various sorts—the experience of other men as well as our other men as well as our of the word of the control of the co

McGRAW-HILL BOOKS?

That single fact or table may be worth many times the price of the book to you.

Buy Your Books on the Budget Plan

Choose Any

of these McGraw-Hill Books that you would like to see—one, or two or a half dozen—as many as you wish. Read them for ten days free—keep those you want—send back those you don't want.

Pay for the books you keep as you use them. If you keep \$15 worth of books, send \$3.00 in ten days and \$3.00 monthly. The smallest monthly payment is \$3.00. If you keep \$6 worth of books, send \$3.00 in ten days and \$3.00 a month later.

The monthly installments must he large enough so that the entire account will he paid in full within six months.

Prices are the same as cash—there is no extra charge for the monthly payment privilege.

Richey-ELECTRIC RAILWAY HANDBOOK

New Second Edition, 798 pages, flexible, packet size. 600 illustrations, \$1.00 net, postpaid.

34.00 nef, postpaid.

The New Richey is virtually en encyclopedia on modern electric railway organization, administration and operation. It is the one great pockethook of practice date, formulae and tables in the electric railway field. The new second edition covers the latest developments—describes new methods—records changes in theory and practice.

2

Harding-ELECTRIC RAILWAY ENGINEERING

New Third Edition, 480 poges, 6x9, 248 illustrations, \$5.00.

This standard work, in its new third edition, gives an up-to-date picture of the theory and practice of electric railway engineering. It covers the principles and applications of train operation, power generation and distribution, equipment and types of

Long-**PUBLIC RELATIONS**

248 pages, 5x8, illustrated, \$3.00.

Best methods of making your public know and understand. Facts, practical and usable.

Blake and Jackson-ELECTRIC RAILWAY TRANSPORTATION

New Second Edition, 437 popes, 6x9, illustrated, \$5.00.

It covers every phase of modern electric railway transportation thoroughly. In addition it gives the most valuable kind of information on handling traffic difficulties, making and maintaining schedules—collecting fares—securing the proper public relations—using the motor bus as a supplementary service—and hundreds of other important electric railway points.

Murray-SUPERPOWER

237 pages, 6x9, 25 diagrams, \$3.00.

Here is the complete book on super-power—an interesting, authoritative account of the whole program from the start, the ideas behind it, its advan-tages, obstacles, possibilities and limi-tations. William S. Murray, the founder of the movament, gives you ac lear, unblased description of SUFER-POWER, as practiced and planned, and shows clearly what it means to the country, to industry and to YOU.



Nash-ECONOMICS OF PUBLIC UTILITIES

413 pages, 6x9, \$4.00 net, postpaid.

This book presents the essential facts and the most mature views upon the underlying financial and economic phases of public utility companies, with particular emphasis on electric railways, electric light and power companies and gas companies.

Riggs-DEPRECIATION OF PUBLIC UTILITY **PROPERTIES**

211 pages, 5x8, \$2.00. A sound and importial discussion of the problems entering into regulation of finances.

Lyndon-RATE-MAKING FOR PUBLIC UTILITIES

209 pages, 5x8, \$2.00.

Decisions and rulings compared and clarified for you. Covers all factors.

Malthie-THEORY AND PRACTICE OF PUBLIC UTILITY VALUATION

200 pages, 5x8, \$2.00.

Principal elements in valuation dis-cussed clearly. Basic economic prin-ciples—existing conditions—a good book to know.

STANDARD HANDBOOK FOR ELECTRICAL **ENGINÉERS**

Fifth Edition, 2137 pages, 4½27, flexible, thumb-indexed, illustrated, \$6.00 net, postpaid.

The Handbook saves time, trouble, worry, bother—and money. The tables, formulas, descriptions of methodric and equipment, explanations of principles, and other electrical engineering data are used day in and day out—it means something to have them in convenient form easy to get at enabling

Mail just this coupon to see these McGraw-Hill books

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York.

... Richey—Handbook, \$4.00.
... Murray—Superpower, \$3.00.
... Blake and Jackson—El.
Railway Transportation, \$5.00.
... Nash—Economics, \$4.00.
... Riggs—Depreciation of Public Utility Properties \$2.00.

\$5.00. Transportation, \$5.00. Harding—El. Ry. Engineering, \$5.00. Standard Hdbk., \$6.00. Long — Public Relations, \$3.00.

Send me the books checked for 10 days' free exemination. Riggs—Depreciation of Public Utility Properties, \$2.00.

... Lyndon—Rate-Making for Public Utilities, \$2.00.

... Malthie—Theory and Practice of Public Utility Valuation, \$2.00.

I agree to return such books as I do not wish to keep, postpaid, within 10 days of receipt, and to remit at the same time my first installment and the balance in equal installments each month. Minimum monthly payments, I understand, are \$3.00, and also that account is to be paid in full within six months.

Name		 	
Home Ad	idress	 	
City		 	
Name of	Company .	 	 E1-14-2

Choose the books you want to see and mail just the coupon



Griffin Wheels

with
Chilled Rims
and
Chilled Back Flanges

For Economy and Safety use GRIFFIN CHILLED WHEELS

GRIFFIN WHEEL COMPANY

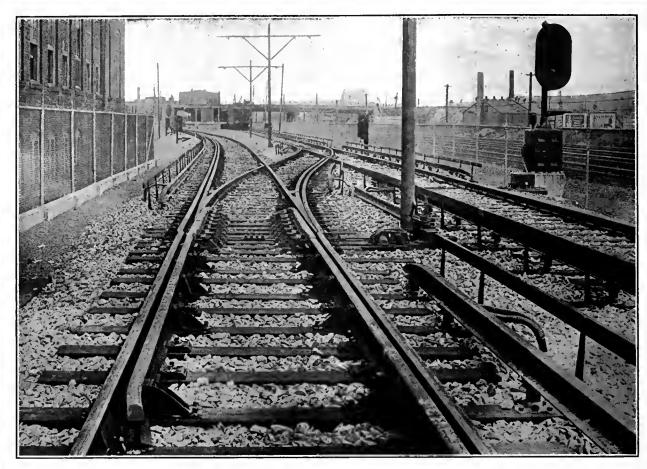
Foundries:

410 No. Michigan Ave.

Chicago, Ill.

Chicago Tacoma Detroit Kansas City Cleveland Denver Los Angeles

St. Paul Salt Lake City Cincinnati Boston Council Bluffs



Dorchester Rapid Transit-Boston-South of Columbia Station

Boston, New York and Philadelphia Subways use Wharton *Tisco* Manganese Steel Special Trackwork

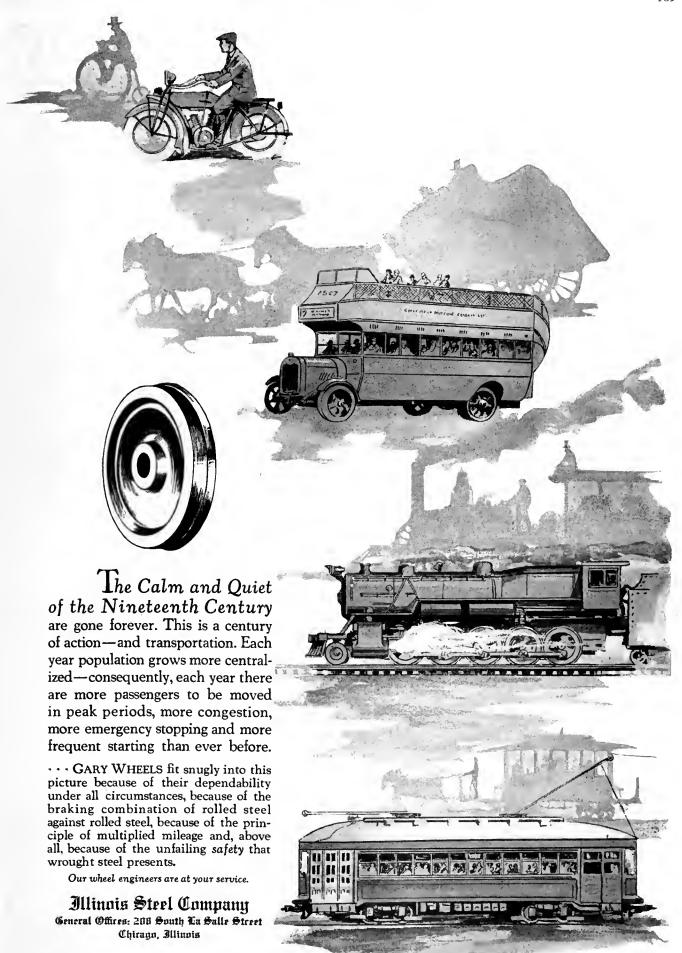
Many similar Wharton Special Trackwork Layouts have been installed in the subways of Boston, New York and Philadelphia, where the heavily loaded trains in the rush hour jams subject them to severe tests.

Wharton Tisco Special Track-

work has the wear-resisting qualities that enables it to stand-up exceptionally well under this service, which insures properly aligned track and smooth operation over long periods with the lowest possible maintenance cost.

Wharton quality, experience and service will save you money in the long-run.

WM. WHARTON JR. & CO., INC. EASTON, PENNA.



\$800,000.00

Worth of

"TOOL STEEL" Gears and Pinions

were specified and bought for

New Equipment

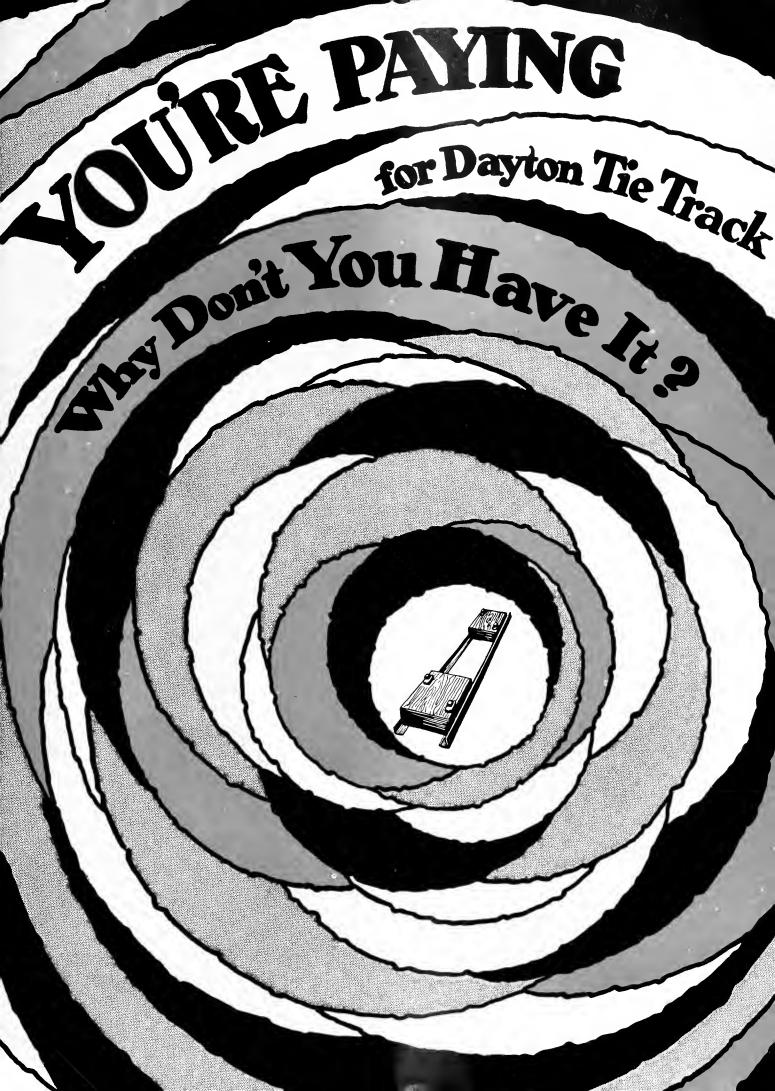
in the last seven years

in North & South America—England, Holland and Australia.

"TOOL STEEL" Gears have proved vastly superior in quality in test after test and railway lines now realize it pays to buy the *best* on their new equipment. You would not think of buying a motor to last only a few years—why get a short life gear?

It pays to specify "Tool Steel" Gears.







You could do without a telephone in your office. But about one day paying for messengers, wasting your own time and possibly missing business would cost you more than the month's bill.

You can get along without the permanent smoothness and infinitesimal maintenance afforded by Dayton Tie Track.

But you are paying for it in-

- 1. Revenue lost from people who will drive their own cars rather than ride on rough track.
- 2. Rolling Stock repairs which mount rapidly as track deteriorates.
- 3. Track maintenance. Keeping old track in the best possible condition costs plenty of money.

More than 150 properties throughout the United States have found that Dayton Tie Track stays beautifully smooth and solid for years. Maintenance is infinitesimal if you can find it at all.

Dayton Tie Track is always Smooth

THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO

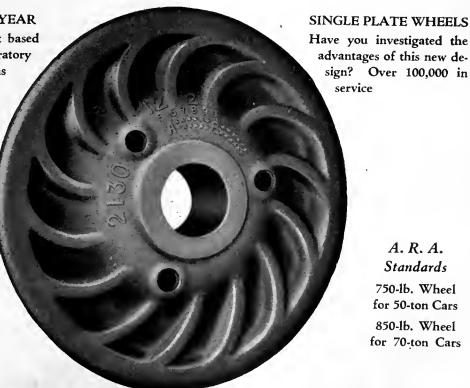
58 Plants—Daily Capacities 20,000 Wheels

Chilled Tread Vheels 625,69

THE CHILLED TREAD WHEEL has figured steadily in the reduction of railroad operating costs and in improved Service.

A steady and marked improvement has attended the manufacture and service of Chilled Tread Wheels. Today's standard of wheel economy is the Chilled Tread Wheel of today.

BETTER EVERY YEAR A slogan and a fact based upon definite laboratory and foundry programs



Have you investigated the advantages of this new design? Over 100,000 in service

A, R, AStandards 650-lb. Wheel for 30-ton Cars 700-lb. Wheel for 40-ton Cars

A, R, AStandards 750-lb. Wheel for 50-ton Cars 850-lb. Wheel for 70-ton Cars

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS 1847 McCORMICK BUILDING, CHICAGO

More-Jones Qua

Consists of

The first thing of importance for consideration is the materials that go to make up products. In this, More-Jones has, thru all its years of manufacture, given particular attention to the grade of materials used. Only materials proven by laboratory test to be most suitable for each individual product are used.

anufacture
This plant has the most modern facilities and a thoroughly trained and equipped organization. The process of manufacture is modern. New Improvements in methods are inaugurated as fast as we find there is a possibility for facilitating our service. Many machines are exclusive to More-Jones production and affords numerous advantages.

esecurch work has always been conducted on an extensive scale in this organization. We have a highly developed system of chemical and engineering research, prospecting for improvements. Patented molds, equipment and special processes have developed from this and have been a factor in producing products that contribute to economical traction service.

we have always considered uniformity as a vital necessity. Thru every department this factor is borne in mind and conscientiously adhered to. Uniformity of the product is the positive assurance of greater operating economy and less of maintenance.

erviceability More-Jones Products have stood the test of time in both city and country traction service. More-Jones Products have maximum life and it is this that helps bring economy to your service right from the start.

More than 50



More-Jones Trolley Wheels

They are finished and bored in one operation, thus insuring proper balance. The metal used is exceedingly tough—an alloy of purest new metal, having maximum conductivity—which provides greater mileage without damage to the overhead lines.

V-K Oil-less Wheels for City and Suburban service and More-Jones lubricated Wheels for high speed requirements insure lowest ultimate cost.



More-Jones Armature Babbitt Metal

Standard on the majority of Electric Railways Systems in this country.

Specially formulated for the exacting requirements of Electric Railway Armature Bearing maintenance.

Its high heat radiation minimizes friction, even under the most trying circumstances.

A trial is the most conclusive proof of its superior inherent characteristics.

"Tiger" Bronze Axle and Armature Bearings

The Lead content, that we scientifically incorporate into this alloy, minimizes frictional wear, resulting in less frequent replacements. Finished oversize or undersize to a perfect running fit with your shafts.

Expertly machined in strict accordance with your specifications, even to the extent of incorporating special features therein, if so desired.

All Armature Bearings lined with our celebrated ARMATURE Babbitt Metal.

"Tiger" Bronze Axle and Armature Bearings insure maximum service under the hardest operating conditions.

Let us give you further information and prices.

NATIONAL BEARING METALS CORPORATION

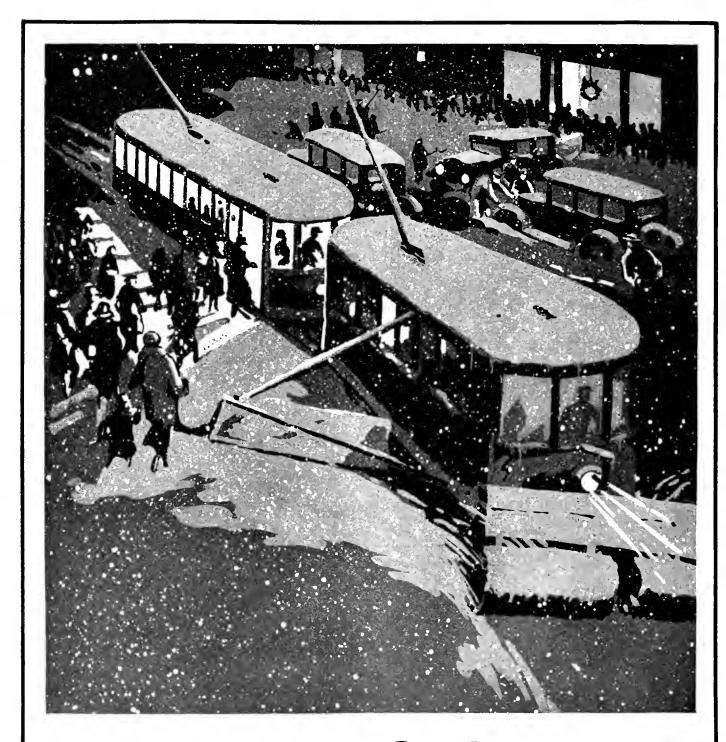
New York, N. Y.

St. Louis, Mo.

Pittsburgh, Pa. Meadville, Pa.

MORE-JONES QUALITY PRODUCTS

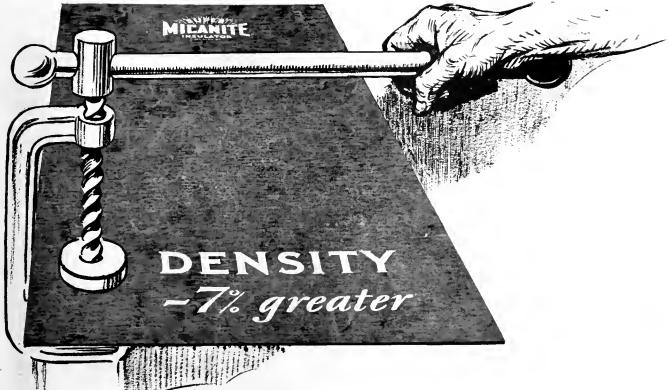
years of Service



SERVICE yesterday - today - tomorrow

Barron G. Collier Inc.

Candler Bldg. New York



- 1 Dielectric strength-10% to 60% greater.
- Volume Resistivity-100% greater.
- 3 Surface Resistivity-300% greater.
- Dielectric Power Loss-34%
- Slippage-shows practically none under pressure.
- Transverse strength-50% to 100% greater.
- 7 Densily-7% greater.
- Carbonization Its binder shows only slight tendency to carbonize under high temperatures and when exposed to arcing.
- 9 Corrosion—Is non-corrosive to copper. Its binder de-composes at a higher temperature and the decomposition products, formed below the carbonization point are neither corrosive nor conductive.
- 10 Effect of heat—slight.

All tests are eonducted in accordance with the standards of the American Society for Testing Materials.

More mica per pound of insulation greater insulating value

—characteristics that are of particular interest to motor manufacturers and repairmen —providing easier commutator assembly, uniform segment spacing and better, more dependable motors.

No detrimental effects are produced on Super-Micanite by the heat developed in soldering leads to commutators arcing or excessive heating does not carbonize the binder.

These practical advantages are responsible for the everincreasing use of Super-Micanite for practically every insulating purpose.

Bulletin No. 111 describes some of the many applications of Super-Micanite. Write for a copy—and let us send you a sample sheet to prove that it is truly a super insulation.

MICA INSULATOR COMPANY

World's Largest Manufacturers of Mica Insulation

New York: 68 Church St.

Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh Cincinnati San Francisco Los Angeles Seattle Works: Schenectady, N. Y. London, England Victoriaville, Canada



MICA INSULATION

OILED CLOTH INSULATION

What makes a "1928 Model" Car?

New developments that meet the needs of today and the demands of tomorrow





Russall

Not the mere fact that is built in 1928. Nor yet the beauty of line and paint that makes for outward attractiveness. What really counts is the ability of the new car to render the kind of service that 1928 people want—at an operating cost that the railway can afford.

The NUTTALL ALUMINUM TROLLEY BASE

with Timken Bearings

Have you seen this remarkable new trolley base? It is the lightest base we have ever made, weighing only 67 lbs., and has all the features of the famous U. S. 20 A base, including Timken Roller Bearings. Wearing parts are of hardened steel, with ample shunts to carry the current, and lubrication is on a once-in-six-months basis. Light as a feather on the wire, this new base reduces wear and is practically immune to dewirement troubles.

The New W-N Drive

for use with lightweight High Speed Motors—

A light compact drive unit for electric cars which makes it possible to use modern high-speed, high-efficiency motors in traction service. All gears are heat-treated and hardened, operating in an oil-tight steel case. The net result is an installation of lower initial cost, with improved operating efficiency and requiring very little maintenance.

R.D.NUTTALL COMPANY PITTSBURGH PENNSYLVANIA

All Westinghouse Elec. & Mfg. Co. district offices are Sales Represen atives for Nuttall Electric Railway Products.

Canadian Agent,
Lyman Tube & Supply Co., Montreal

Follow the trend in maintenance and replacements—



U.S. 20 A Trolley Base with Timken Bearings

The NUTTALL

TIMKEN ROLLER BEARING TROLLEY BASE (form U. S. 20 A)

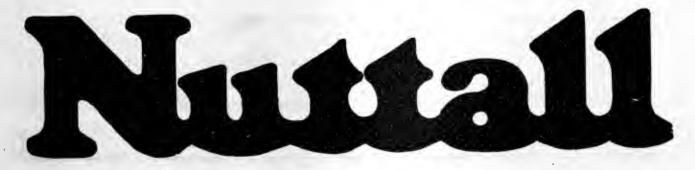
The most advanced type of the more conventional trolley base. Nuttall U.S. 20 A is equipment on many of the most successful of receot modern cars. A simpler, loncer-lived, easier-to-maintain trolley base would be hard to imagice. Timken has made a special double-race roller bearing especially for this service, and the hase actually hange on the bearings, not on the center pin. Ample shunts prevent arcing; and lubrication is on a once-insix-months hasis.

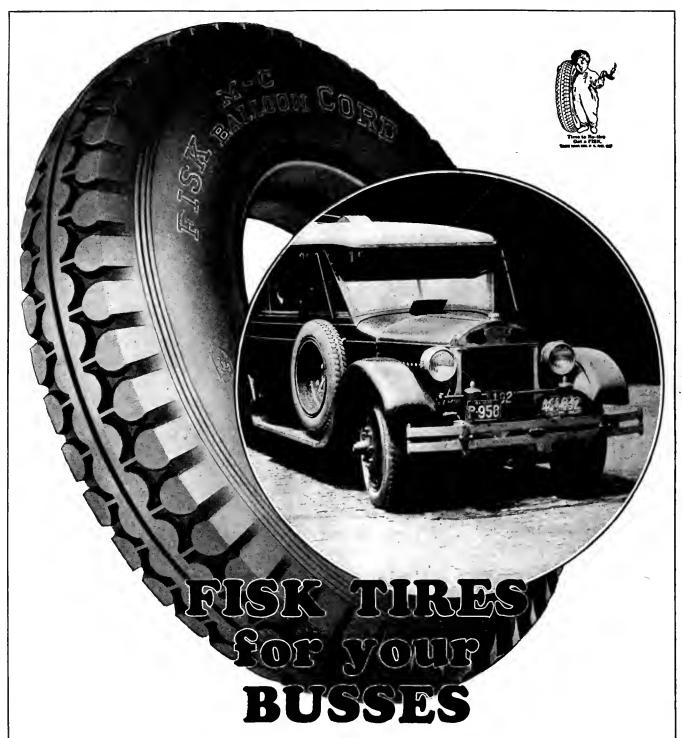


Helical Gear and Pinion

NUTTALL STANDARD HELICAL GEARS

Nuttail Standard Helical Gears will do more to make a car comfortable and easy-riding than all the uphoistering you could put into it. Their meshing is like the turning of a screw, smooth continuous and vibrationicss. They eliminate at once all the noise and chatter of old time gears. And, because of the Nuttail BP Heat Treatment which they undergo, they show a service life so substantially longer as to warrant their adoption on this score alone.





The Test of Your Service

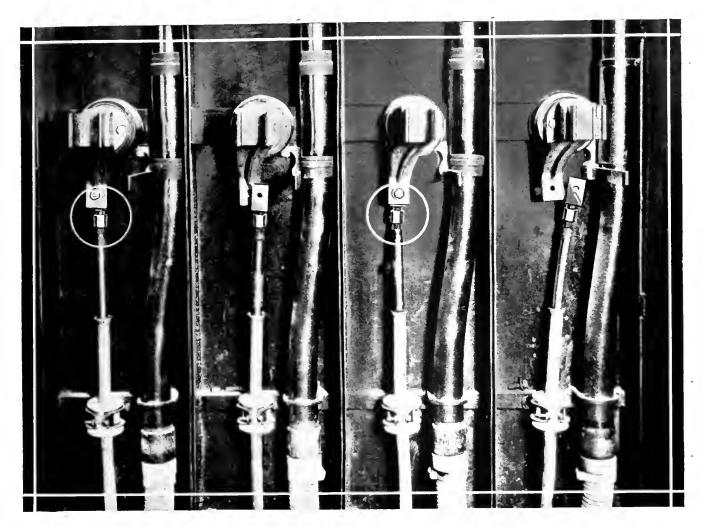
To assist you in maintaining schedules, Fisk engineers have built three features of outstanding dependability into the Motor Coach Balloon Tires.

With its multi-cable bead (original with Fisk), "Fillerless"

Cord Construction (a Fisk patented process) and tough, heat-resisting tread, the Fisk Motor Coach Balloon has demonstrated that real comfort and safety can be built into a tire without increasing mileage cost.

THE FISK TIRE COMPANY, INC., CHICOPEE FALLS, MASS.

Frankel Solderless Connecters



in the substation of a large Eastern Utility



Front Lug

There is a size and type of Frankel Connector for every connect-up, whether Central Station, Substation, Industrial Plant, Railroad, Mine, or wherever there is wiring for distribution. Write for Frankel Catalog.

FRANKEL CONNECTOR CO., INC. 177 Hudson St., New York, N. Y.



DISTRIBUTORS

Westinghouse Elec. & Mfg. Co.

Graybar Electric Co., Inc.

Sales Offices in All Principal Cities

Equipment for Electrical Fare Registration costs no more than Manual Equipment

When the original cost of a system is no greater, and the savings effected through it are considerable, there can only be one answer—adopt it! That's exactly what operators of *modern* cars are doing.

Electrical Registration has proven itself on the basis of speed and economy in handling fares and passengers. The R-11 International Double Register has, for many years been the accepted standard for mechanical operation. B-12 electric backs have been in service long enough to record a million fares without noticeable wear on working parts. Solenoids using a line current of 350 to 650 volts D.C. operate these backs. The circuit is completed by the F-14 foot switch—small in size, convenient in operation, fast, and well insulated.



R-11 Double Register



B-12 Electric Back



F-14 Electric Foot Sw 'c

The International Register Company

15 South Throop St., Chicago

"WELD PLATES"

For EFFICIENT, ECONOMICAL

JOINTS

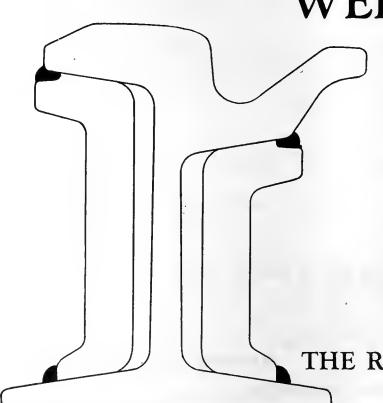
Do you believe in statistics? Rely on performance records? If so the performance records of the many "Weld Plates" now in use will convince you that they lead the bar-weld joints in efficiency and economy.

"Weld Plates" represent the most modern welding practice. They are the strongest and most up-to-date plates rolled especially for electric welded joints. Note the shape—the grooves for retaining plenty of weld metal along the upper edges—the wide contact areas at top and bottom—the suitability for the use of short bolts.

A trial will convince you of their efficiency and economy.

THE RAIL JOINT COMPANY

165 Broadway, New York





bar designs, skeleton lettering, IN or OUT forms, all are signals controlling proper use according to lines, transfer points, direction, car to bus, re-transfer and

like privileges.

AUDITING: Accurate numbering is the auditor's best control. Carelessness, errors and unknown leaks often can be caught only through the numbering control.

Most Executives recognize that Globe has specialized in the design and production of tickets and transfers for more than half a century. They seek our advice on important fare control questions. Why not you?

*Three "MUSTS" in Fare Collecting SPEED—CONTROL—ECONOMY

Branch Factories:

New York Boston Los Angeles TICKET COMPANY

District Offices:

Baltimore

Albany

Cleveland Cincinnati

112 North Twelfth Street PHILADELPHIA

Safety and Service

ROOT Specialties help you maintain both

ROOT LIFE GUARDS

This is probably the simplest and most efficient life guard ever devised. The "basket" springs to the pavement instantly when the "gate" is struck, and no object can get under or through it. Simple, and of very sturdy construction, the initial cost of the Root Life Guard is low and maintenance negligible.



ROOT Spring Snow Scrapers

Either the Short Blade Scrapers illustrated or the No. 6 Scraper, for removing snow the entire width of the track, will clean the tracks of snow and ice with a minimum of attention, and regardless of irregularities in track or roadway. They are being used by over 80% of the electric railways in the United States.

Bulletins and quotations on request. Demonstrations gladly arranged.

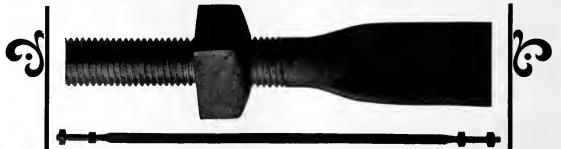
ROOT SPRING SCRAPER CO., Kalamazoo, Mich.

Representatives:

Ross F. Hayes 30 Church St., New York City Harry M. Euler Co., Portland, Oregon.

Charles N. Wood Co. 948 Old South Bldg., Boston, Mass. Railway, Power & Engr. Corp. 133 Eastern Ave., Toronto, Ont.

Witherow Die-Rolled Tie Rods



¶Produced by the Witherow Continuous Die-Rolling Process.
⋮

Tiner grain structure is always assured.

¶No forging, welding or upsetting to cause weak spots by unequal heating and working.

¶No laps or pockets for moisture to col. lect and cause corrosion.

QUniform cross sectional area eliminates all excess weight.

QProduced in all standard sizes with $\frac{3}{4}$ ", $\frac{7}{8}$ " and 1" terminals.

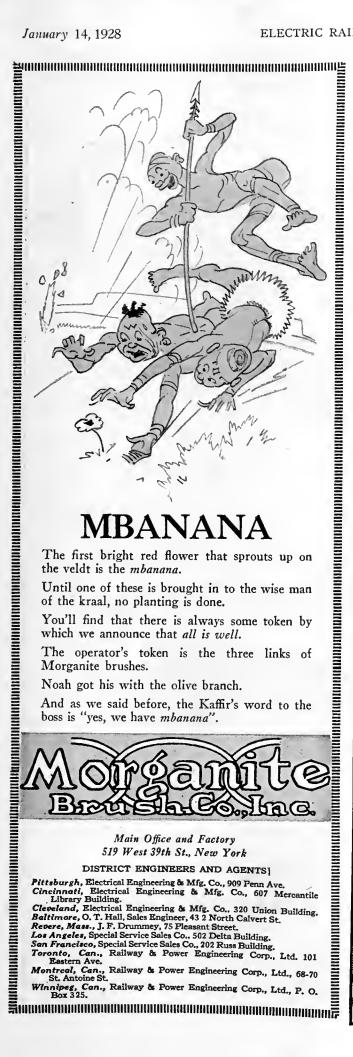
May we quote on your requirements?

WITHEROW STEEL CORPORATION

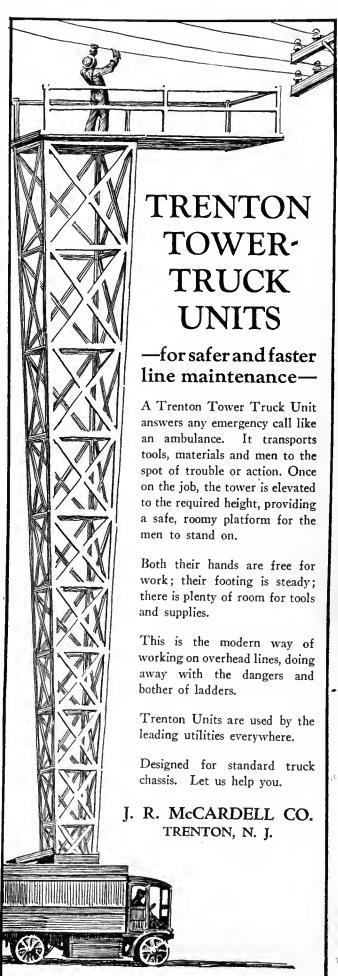
PITTSBURGH

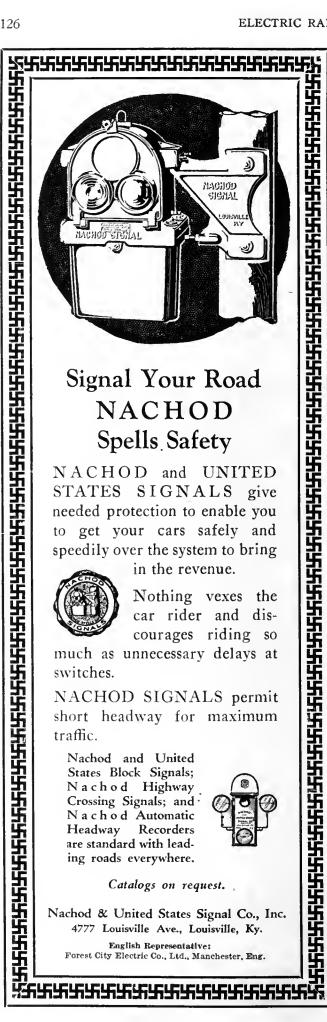


PENNSYLVANIA













As year after year passes on-



Plush

remains the preferred upholstery material

During the more than 36 years that Massachusetts Mohair Plush has been the railroad standard, it has given many roads over twenty years of active service!

Electric Railway executives are calling for plush because it is the most up-to-date material on the market.

Passengers riding on plush are supported on myriads of little springs—the utmost in ease and luxurv.

Specify Plush for those new cars you are buying this year. Send now for samples and quotations.

MASSACHUSETTS MOHAIR PLUSH CO.

Main Office:

80 Federal St., BOSTON, MASS.

Makers of BAY STATE PLUSH

New York Agent: Sisson Supply Co. Grand Central Terminal, New York City

Western Agent: Midgley & Borrowdale 2 McCormick Building, Chicago, Illinois

Ramapo Automatic Return Switch Stands Reduce the cost of Maintenance of Equipment—

by helping to prevent accidents and wrecks! Especially at switches on high speed lines they give the utmost safety. Efficient springs allow cars to pass through the switch but always return the points tightly to original setting. The conspicuous target, rigidly connected to the switch points, indicates positively their position, either open or closed or danger if a switch point is held partially open by an obstruction. Made in various styles and sizes. Send for complete information.





EIGHT WORKS
RAMAPO-AJAX-ELLIOT
HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOISEAST ST. LOUIS, ILL
PUEBLO, COLORADO
SUFERIOR, WISCONSIN
LOS ANGELES, CALIF.

—Saves the Company's Money and the Public Likes It

VITRIFIED brick continues to be the favorite material for paving the track area.

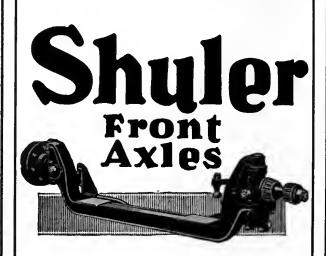
It is economical and durable; permits repairs to be made easily; does not "shove" or "roll."

The interests of both the street railway company and the public are best served with vitrified brick pavements.

> Send for complete information to National Paving Brick Manufacturers Association, 332 S. Michigan Avenue, Chicago.

VITRIFIED BRICK PAVEMENTS

FACE THE FUTURE - PAVE WITH BRICK



For TRUCKS, MOTOR BUSSES, TAXIS

And a Complete Line for TRACTORS and TRAILERS

CONSTANT QUALITY

Continued and constant quality is not too much to expect in any product. We expect these things when buying from others and strive to give the same to you.

FRONT AXLES ONLY

Shuler Axle Co.

Incorporated

Louisville, Ky.

Member of Motor Truck Industries, Inc., of America



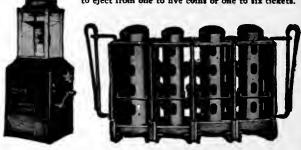
JOHNSON FARE COLLECTING SYSTEMS



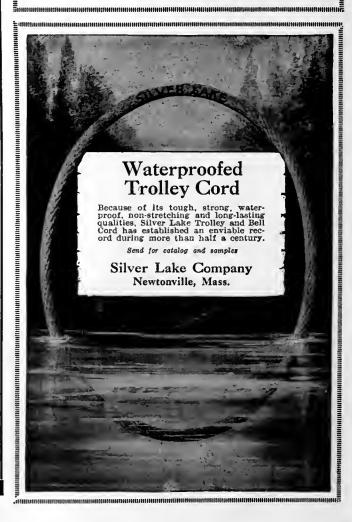
Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

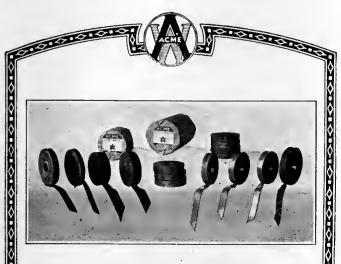
When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.



Johnson Fare Box Co.
4619 Ravenswood Ave., Chicago, Ill.





Send a Heavyweight!

Don't send a runner-up to do a heavy weight's job. It costs real, bankable cash to tear down a big job because somebody tried to save a few nickels on the tape. It may do to take a chance at a prize fight, but it isn't being done in our best repair shops!

For Safety, Use Acme Varnished Tape

Electrically and Physically Tested for

DIELECTRIC STRENGTH
DIELECTRIC CONSTANT
DIELECTRIC LOSS
INSULATION RESISTANCE
POWER FACTOR
FLEXIBILITY
RESISTANCE TO TEAR
TENSILE STRENGTH
RESISTANCE TO OILS, ACIDS
AND GASES
RESISTANCE TO IMPREGNATING
COMPOUNDS

Acme Varnished Tapes are furnished in widths of $\frac{1}{4}$ " and wider, and in rolls of continuous length without splices. Special widths and finishes supplied on order. Write for catalog 3-J for your files.

ACME WIRE PRODUCTS

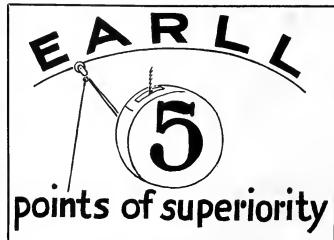
THE ACME WIRE CO.

Main Office and Plant, New Haven, Conn.

Branches:

New York: 52 Vanderbilt Ave. Chicago: 427 West Erie St. Cleveland: Guardian Bldg.

10101010101010101010101010101



- 1. "No Wear Check Pawl" never strikes point of tooth—always slips into full engagement.
- 2. "Free Winding Tension Spring" handles wet rope efficiently.
- 3. "Ratchet Wind" makes retriever operation easy.
- 4. "Emergency Release" great convenience and added safety.
- 5. "Perfect Automatic Lubrication of every part."

Send for our latest bulletin to get more complete particulars.

C. I. EARLL, York, Pa.

Foreign Agents:
International General Electric Co., Schenectady, N. Y.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Out.



EARLL

Catchers and Retrievers

}ankers@Fngineers

Ford, Bacon & Pavis

Engineers

115 Broadway, New York PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White **Engineering Corporation**

Engineers-Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

Design and Construction Examinations Reports Appraisals Industrial and Public Service Properties

NEW YORK

ROSTON

CRICAGO

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys Better Service—Financial Reports Appraisals—Management

52 Vanderblit Ave.

New York

SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design

Examinations

Construction Reports

Management Valuations

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineers

Appraisale Reports Rates Service Investigation Studies on Financial and Physical Rehabilitation Reorganization Operation Management

683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

J. ROWLAND BIBBINS

Engineer-2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies
EXPERIENCE IN 20 CITIES

C. B. BUCHANAN

W. H. PRICE, JR. Sec'y-Treas.

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction Financial Reports, Traffic Surveys
and Equipment Maintenance
BALTIMORE Phone: NE
Bank Bidg. Hanover: 2142 49 V

NEW YORK 49 Wall Street

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

STEVENS & WOOD

INCORPORATED

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells APPRAISALS

Albert W. Hemphill

INVESTIGATIONS COVERING ion Management Operation 43 Cedar Street, New York City Construction Reorganization

ENGINEERS AND CONSTRUCTORS

120 BROADWAY, NEW YORK

ENGINEERING CONSTRUCTION

YOUNGSTOWN, O. CHICAGO, ILL.

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W Washington Street, Chicago, Ill.

MCCLELLAN & JUNKERSFELD

Incorporated ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations
Transportation Problems—Power Developments 68 Trinity Place, New York

Chicago

St. Louis

E. H. FAILE & CO.

Designers of

Garages— Service Buildings—Terminals

441 LEXINGTON AVE.

NEW YORK

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass—Differential Fares—Ride Selling Holbrook Hall 5-W-3 160 Gramatan Ave., Mt. Vernon, N. Y.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES

ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CLEVELAND, Guardian Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street

142 100**029**00130003091201192011300112211251142701741



Bayonne, N. J. Barberton, Ohlo

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE., Failing Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK

Street Railway Inspection DETECTIVES

131 State St. BOSTON

TRAFFIC CONSULTANT

Freight Rate, Tariff and Traffic Analyses;
Advisory Freight Traffic Assistance
on Special or Monthly Basis;
Preparation of Cases before Interstate Commerce
Commission and State Commissions.

HALSEY McGOVERN

Mills Bldg., 17th and Pa. Ave., Washington, D. C.

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



H B LIFE GUARDS

PROVIDENCE FENDERS

Manufactured by

CONSOLIDATED CAR FENDER CO., PROVIDENCE, R. I.

General Sales Agents
WENDELL & MacDUFFIE CO., 110 E. 42nd St., N. Y. C. HONORE CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONT

RAIL JOINTS **DYNAMOTORS** WELDING ROD UNA Welding & Bonding Co. Cleveland, Ohio.



CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetless—Light Weight Best for Service — Durability and Economy. Write Us.

Chillingworth Mfg. Co. Jersey City, N. J.

GOLD CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

.

ELECTRIC HEATERS WITH OPEN COIL OR ENCLOSED ELEMENTS THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE



WESTERN

BUTT TREATING ALL GRADES

TIES

BELL LUMBER CO., Minneapolis, Minn.



STUCKI SIDE BEARINGS

A. STUCKI CO. Oliver Bldg. Pittsburgh, Pa.

Efficient Bus Heating

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.

7960 Lorain Ave.

Cleveland, Ohio

CREOSOTED

Railroad Cross-ties; Switch-ties; Bridge Timbers; Construction Timbers; Mine Timbers, Lumber; Piling; Poles; Posts and other Forest Products

F.Prettyman & Sons

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

TAYLOR ELECTRIC TRUCK CO.

TROY, N. Y.

Manufacturers of

ELECTRIC RAILWAY CAR TRUCKS for MODERN EQUIPMENT

Journal Bearings, Brake Shoes, Journal Boxes, Brake Chains, Pedestals Brake Heads Center Bearings, Etc.

ELLIPTIC and COIL SPRINGS for ANY TYPE or MAKE of CAR TRUCK Springs for Automobile Trucks and Buses

QUALITY at LOW COST. WRITE US.

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.

R A HEGEMAN, Jr.. President F. T. SARGENT, Secretary

B. A. HEGEMAN, First Vice-Pres. and Trees, J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co. Graybar Building, 420 Lexington Ave.. New York

BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass, Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Piniona Anglo-American Varnish Co., Varnishes, Enamels, etc. National Hand Holds Genesco Paint Oils Dunham Hopper Door Device Garland Ventilators Welter Tractor Snow Plows Feasible Drop Brake Staffs Ft. Pitt Spring & Mig. Co., Springs

.

Flaxilinum Insulation
Economy Electric Devices Co.
Power Saving and Inspection
Meters
National Sector Persons Com-Meters
National Safety Devices Company's Whistle Blowers,
Gong Ringers and Brake
Hangers
Godward Gas Generators Cowdry Automotive Brake Testing Machine

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa. Sales Offices:

Chicago Philedelphia

Cleveland Pittsburgh

New York Dallas

Pocific Coost Representative: United States Steel Products Compan Portland San Francisco

Export Representative:
United States Steel Products Company, New York, N. Y.

FARE **BOXES** for BUSES

Let us tell you of this especially designed box for this class of service.

The Cleveland Fare Box Co. 4900 Lexington Ave., Cleveland, O. Canadian Cleveland Fare Box Co., Ltd. Preston, Ontario

COUNTING And Sorting Machines CHANGES Tokens

It's the Extra Care—

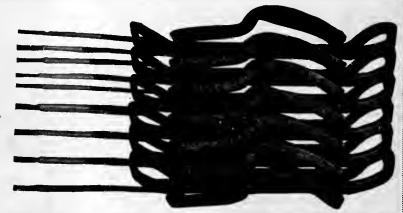
That goes into the making of Elliott-Thompson coils that makes them better.

That, together with nearly forty years experience, has taught us how to build coils that fit—that slip into slots without abuse -that last longer-and save time and labor.

Ask about them.

The Elliott-Thompson Electric Co.

Ajax Bldg., Cleveland, Ohio





Another year added to the PERFORMANCE RECORD OF KERITE

THE KERITE WHELATER COMPANY INC

A simple way to survey cleaning costs

N^O exhaustive research is necessary. A simple comparative test with Oakite materials will quickly tell you whether your cleaning operations are on an efficient, low-cost basis.

How to make the test? Just call in an Oakite Service Man and watch him clean a dirty car, a greasy, muck-covered truck, or do any other cleaning job you specify. Check the amount of Oakite used, and the time and labor expended in doing the work. Compare results!

Hundreds of railway concerns have discovered worthwhile economies through this practical test. It will point the way to similar savings in *your* cleaning. Write us, and Service Man will call, without obligation.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U.S. and Canada

Oakite is manufactured only by

OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N.Y.

OAKITE

Industrial Cleaning Materials and Methods



Strombos Signals for Railway Service

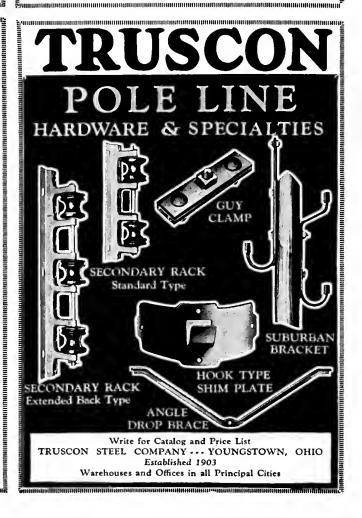
A pleasing sound of tremendous volume is emitted from the powerful Strombos Signal which is admirably suited for railway service. Day in, day out, it broadcasts a warning of approaching danger and promotes safe and efficient railway operation.

The Strombos Signal operates on an air pressure of 10 lbs. and over and is controlled by a lever valve and cord. It uses only 1/10 the volume of air required by a whistle. It has no moving parts which might fail in the emergency.

Write us for more complete data.

AMERICAN STROMBOS CO. INCORPORATED

18th & Market Sts., Philadelphia, Pa.



EARCHLIGHT

USED EQUIPMENT @ NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED-RATE PER WORD:

Positions Wonted, 4 cents a word, minimum 75 cents an insertion, payable in advance. Positions Vacont and all other classifications, 8 cents a word, minimum charge \$2.00, Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertious of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches. \$4.59 an

4 to 7 inches. \$3.30 an

8 to 14 inches. \$1.9 an

Rates for larger spaces, or yearly rates, on req

An advertising bick is measured vertical

and column, 3 columns—36 inches—to a

POSITIONS WANTED

GENERAL superintendent or manager; successfui; seeks connection with a future. PW-77, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MANAGER or superintendent ANAGER of superintendent — litteen years' experience in electric railway field. With forty-five mile interurban line operating co-ordinated bus service. Will consider tropical countries. Excellent references. M. L. Middleton, Terminal Statlon, Norfolk, Va.

MEN seeking positions in the electric railway field can reach over 6,000 executives by advertising in the Positions Wanted column. The cost is small.

WANTED

Experienced Public Utility Executive

for Company with gross revenue of \$5,800,000.00, operating electric utility with two Hydro-electric plants and one steam plant, gas utility and street railway utility, each utility being in charge of a Manager who will report to him. Property is located in growing city of 250,000 population. Position offers an excellent opportunity to right man. Apply stating experience and salary expected, to

P-74, Electric Railway Journal Tenth Ave, at 36th St., New York City

"SEARCHLIGHT" Opportunity

—to help you get what you want.

Advertising

—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want "Think SEARCHLIGHT First"

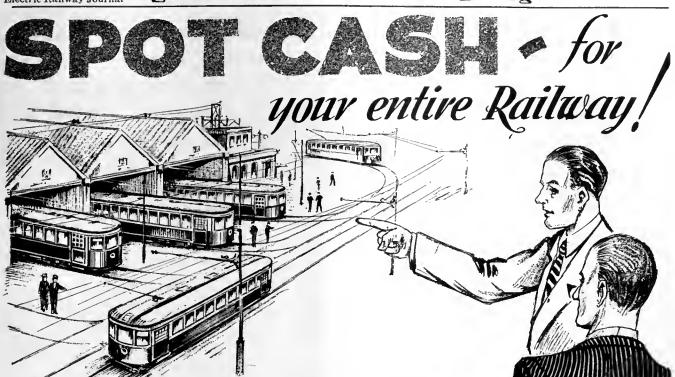
Searchlight can help you—

HUNDREDS of miscellaneous business problems pertaining to Electric Railway Operation can be quickly and easily solved through the use of the Searchlight Section of this publication.

The Searchlight Section is the classified advertising section for giving publicity to all kinds of business wants of interest to other men in the field. It is the weekly meeting place of the man with a miscellaneous business need and the men who can fill that need,

When you want additional employees, want to buy or sell used or surplus Railway equipment, seek additional capital or have other miscellaneous business wants—advertise them in the Searchlight Section for quick, profitable results!

Think "SEARCHLIGHT" first



TF you are contemplating the disposal of your entire railway, we offer you the opportunity of getting spot cash for it and being through with it—no long months of liquidating—no liquidating expense and detail -no question as to how much the liquidation will net you in the end!

We pay highest prices commensurate with present day market values and are especially equipped to do our own dismantling quickly and efficiently.

Send complete details of your properties and we will arrange to make inspection and appraisal and submit our best proposition.

H. E. SALZBERG CO., Inc.

Transportation Building

225 BROADWAY, NEW YORK CITY

Phone Whitehall 3147-8-9

Special Offering

Used Railway Equipment Sacrifice Prices!

This equipment has been secured as the result of recent Railway pur-chases. It is in excellent condition and offered at prices that will save you considerable money.

Write or wire for our prices or more detailed information about any item offered.

Rotary Converters (60 cycles) Complete substation

750 kw., Westinghouse, 1,200 r.p.m., 600 volts, 60 cycle, 300 kw., Westinghouse, 1,200 r.p.m. 600 volts, 200 kw., G. E., 60 cycle, 1,200 r.p.m., 600 volts,

Rotary Converters (25 cycles)

1000 Kw., G. E., 3 ph., 25 cy., 600 volts, 500 Kw., G. E., 3 ph., 25 cy., 600 volts, 300 kw., Westinghouse, 1,200 r.p.m., 600 volts,

G. E. 203-L. G. E. 1000 G. E. 67. G. E. 80 Westinghouse 68C

Air Compressors Chicago Pneumatic, 27

Controllers K-6 and K-28-B.

Sweepers and Plows

Double truck Snow Sweepers. Single and double truck Snow Plows.

Motor-Generator Sets

360 hp., G E. Induction Motor, 3 ph., 60 cycles, 2200 volts, 514 r.p.m. direct-connected to 250 Kw., G. E. Generator, 600 volts. Complete with switchboard.

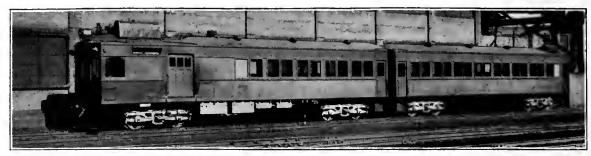
Cars

Line Cars—Sand Cars—Fl Cars. All standard gauge and equipment.

January 14, 1928 Electric Railway Journal

New Motorized Two-Car Railroad Passenger Train

For Sale—Attractive Price for Immediate Sale



Specifications of Motorized Passenger Car-

Weight—65,000 lbs.
Seating Capacity—36 passengers.
Coupled Length—53 feet.
Speed—4 speeds ahead and 4 reverse.
Maximum speed 50 miles per hour,
motor car alone. Motor car with trailer,
max, speed 44 miles per hour.
Drive—Direct mechanical drive to all four axles

Couplers—Standard Master Car Builders Contour at std. height. Heating—Vspor Car Heating Company's two-unit type.

Brakes—Brake drums on all axles, twoshoe clasp type, 2 cyl, 12 cu.ft. Westinghouse air compressor set for 110 lbs.
120 lbs. 8x12 in. Type "N" Westinghouse passenger air brake cylinder.
Electric Lighting—Safety Car Heating and
Lighting Company's 32 volt, 1 kw. gencrator mounted on engine.
Fuel—Two 100 gal, fuel tanks. Fuel fed
to carburetor by "Triplex Autopulse"
electric-magnetic fuel pump.
Bearings—All propeller shaft and transmission bearings of the anti-friction type,
Hyatt, Timkin, New Departure or S. K.

F, axles on Hyatt roller bearings.
Engine—Horsepower 175 at 1300 r.p.m.
Clutch.—B-14 Twin Disc clutch.
Body—Pressed steel diaphram and bolsters.
Main posts of steel with wood fillers.
Door posts, corner posts, moulding and
letter board panels of pressed steel sections.

setter board panels of pressed steel sections.

Seats—Hsle and Kilburn 38 in, long Walkover car seats with Zapon Co.'s "Muleskin" leather cloth upholstery—Hale and Kilburn No. 208 de luxe drivers' seat covered with Zapon Co.'s "Muleskin" leather cloth.

Trailer Car Follows Power-Car Design-

The design of the trailer-car body, conforms in all respects with the construction of the passenger compartment of the power-car. The steel framing is ideotical except for such changes as result from the substitution of a vestibule end in place of the engine compartment, and all equipment such as seats, hardware, and lighting, heating and washroom equipment, is identical with that used in the power-car.

The coupled length is 52 ft., the seating capacity is 58, and the weight 54,000 lb.

Write for Price and Detailed Description

RENNOLDS EQUIPMENT CO., 812 Union Trust Bldg., Chicago, Ill.

FOR SALE

.

CARS

4-Modern light weight oneman double truck cars with 4—G.E.—265 motors, 26 in. wheel, 2 years old.

Transit Equipment Company Cars - Motars

501 Fifth Avenue, New York

Railway Equipment

Bought, Sold, Exchanged G. T. ABEL

393 7th Ave., New York City

Telephone: Longacre 7620

FOR SALE

15 BIRNEY SAFETY CARS

Brill Built

508 or G. E. 264 Motors Cars Complete--Fine Condition ELECTRIC EQUIPMENT CO. Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

10-G.E. 247-A Motors. 6-K. 28-B Controllers.

.........

20-K. 6 Controllers.

10-Westinghouse 68 and 68-C Motors. J. W. GERKE, 303 51h Ave., N. Y. C.

FOR SALE

13.000 kw. Used Rotary Converters
8-1500 kw.-25 cycles
2-500 kw.-25 cycles
with Transformers-Switch Boards, etc.
Price: \$5.00 per kw., in place, Cincinnati,
Ohio.
For further information address

The Cincinnati Sireet Railway Company

FOR SALE

Three Birney Safety One Man Cars, Cincinnati built, Agasote Ceiling, fine condition. Practically re-built each year.

Also one McGuire Cummings Snow Sweeper, long brush type, good as new.

SUSQUEHANNA TRACTION COMPANY Lock Haven, Pa.

WANTE

WANTED

MOTOR CAR

or heavy switching service, cab type, ody of steel construction not over 40 ft. n length.

W-76, Electric Railway Journal Guardian Bullding, Cleveland, O.

WANTED

20—K 35 G. or H.H. Controllers

W-75, Electric Railway Journal Tenth Ave. at 36th St., New York City

EARCHLIGHT **ERVICE**

Covers the advertising of

Agencies Wanted
Agentes Wanted
Agentes Wanted
Auction Notices
Bilds Wanted
Books and Periodicals
Buildings for Sale
Business Opportunities
Civil Service Opportunities
Contracts to Be Let
Contracts to Be Let
Contracts Wanted
Desk Room for Rent
Desk Room for Rent
Desk Room Wanted
Educational
Employment Agencies
Evening Work Wanted
Foreign Business
For Exchange
For Rent
Franchises
Industrial Sites
Labor Bureaus
Machines Shops
Machinery Wanted
New Industries Wanted
Partners Wanted
Partners Wanted
Partners Wanted
Partners Wanted
Patent Attorneys
Patents for Sale
Plante for Sale
Positions Vacant
Proposals
Receivers' Sales
Representatives Wanted
Salesmen Wanted
Second Hand Equipment
For Sale
Exchange
Wanted
Specialties
Tutoring
Vacation Work Wanted
Water Front Property
Work Wanted
Miscellaneous for Sale
for Rent or Want Ads.

Can we serve you?

Miscellaneous for Sale for Rent or Want Ads.

\$200,000 worth of ROLLING STOCK and EQUIPMENT offered at

SACRIFICE PRICES



Double Truck, Medium Weight, All-steel Car.



Double Truck, Light Weight, Birney Type Car.



Single Truck, Snow Sweeper.



Double Truck, Snow Plow.

By the

IRVING S. VAN LOAN CORP.

We have just purchased all the equipment and rolling stock of the Morristown County Traction Company at Morristown, New Jersey. All of this equipment is now offered at sacrifice prices to effect quick disposal. You buy it right out of service, ready for operation. We can make arrangements for any alterations, re-painting, etc. Inspect this equipment, buy, and save money! Write for complete descriptive circular.

- 15-All-Steel Cars-double truck, medium weight, equipped for one or two man operation. (as illustrated)
- 10—Birney Type Cars—all steel, double truck, light weight, equipped for one or two man operation with all known safety devices. (as illustrated)
- 15—Birney Type Cars—all steel, single truck, fully equipped for one or two man operation with all known safety devices.
- 10-Brill Cars-semi-convertible, double truck, fully equipped for one or two man operation.
- 1-Snow Plow-double truck, air operated noses, fully equipped.
 (as illustrated)
- 4—Snow Sweepers—single truck, modern type, fully equipped.
 (as illustrated)
- 1-Trailer Flat Car-double truck, practically new.
- 2-Line Cars-double truck, fully equipped.
- Supply Parts-\$20,000 worth for above equipment.
- 9—Rotary Converters—300 to 500 kilowatts, complete with transformers, switchboards, etc.

ALSO

3 Track Grinders, 1 Bonding Machine, Shop Tools, Sub-station Equipment, 48 miles 70 lb. ASCE Rail, Feed and Trolley Wire.

HIGHEST SPOT CASH PRICES PAID FOR RAILWAY EQUIPMENT

Why sell your surplus railway equipment, at scrap prices, when you can get resale value prices from us? We are Railway Liquidation Specialists and will pay the highest spot cash price for anything in railway equipment, from a single armature to a complete railway! Let us quote on what you have for sale. Compare our prices!

The IRVING S. VAN LOAN CORP.

1819 Broadway, New York City

Telephone: Columbus 4278

Advertising, Street Car Collier, Inc., Barron G. Air Brakes General Electric Co. Westinghouse Air Brake Co. Air Circuit Breakers Roller Smith Co.

Air Springs
Cleveland Pneumatic Tool
Co., The

Ammeters Roller Smith Co.

Anchors, Gny
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armacuce Shop Tools
Elec. Service Supplies Co. Automatic Beturn Switen

Stands Ramapo Ajax Corp. Automatic Safety Switch Stands Ramapo Ajax Corp.

Axles Axies

Bemis Car Truck Co.

Bethlehem Steel Co.

Brill Co., The J. G.

Carnegrie Steel Co.

Cincinnati Car Co.

Standard Steel Works

Taylor Electric Truck Co.

Westinghouse E. & M. Co. Axles, Front Shuler Axle Co.

Babbit Metal National Bearing Metals Corp.

Badgee and Buttons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry National Carbon Co Nichols-Lintern Co.

Batteries, Storage Electric Storage Battery Co. Williard Storage Battery Co. Itearings, Anti-Friction Hyatt Roller Bearing Co.

Bearinge and Bearing Metals
Bemis Car Truck Co.
Srill Co., The J. G.
Cincinnati Car Co.
National Bearing Metal Corp.
Taylor Electric Truck Co.
Westinghouse E. & M. Co.

itearings, Ball Norma-Hoffmann Bearings Corp. SKF, Industries, Inc.

Bearings, Center and Roller Side Cincinnati Car Co. Cincinnati Car Co.
Stucki Co. A.
Bearings, Roller
Hyatt Roller Bearing Co.
Norma-Hoffmann Bearings
Corp.
SKF. Industries, Inc.
Timken Roller Bearing Co.

Bells and Buzzers Concolidated Car Heating Co.

Belle and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Sarvice Supplies Co.

Benders, Rail Railway Trackwork Co.

Body Material, Haskelite Plymeti Haskelite Mfg. Corp. Bodies, Bus Bender Body Co.

Brill Co., The J. G. Cummings Car & Coach Co. Fitzjohn Mfg. Co. Lang Body Co.

Railer, Tubes National Tube Co.

itoliers
Babcock & Wilcox Co.

Bond Testers American Steel & Wire Co. Electric Service Supplies Co. Roller Smith Co.

Bonding Apparatus American Steel & Wire Co. Elec. Service Supplies Co. Chio Brass Co. Rallway Trackwork Co. Una Welding & Bonding Co

Bonds, Rail American Steel & Wire Co. Elec. Service Supplies Co. General Electric Co. Ohio Brass

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Railway Trackwork Co. Una Weiding & Bonding Co. Westinghouse E. & M. Co. Book Publishers McGraw-Hill Book Co.

Brackets and Cross Arms
(See also Poire, Ties,
Poste, etc.)
Bates Expanded Steel
Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co. Hubbard & Co. Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co. National Ry. Appliance Co. Westinghouse Tr. Br. Co.

Brake Shoes
American Brake Shoe &
Foundry Co.
Bemis Car Truck Co.
Brill Co.. The J. G.
Taylor Electric Truck Co.
Brake Testers
National Ry. Appliance Co.

Brakes. Brake Systems and
Brake Parts
Bemis Car Truck Co
Brill Co. The J. G.
Cincinnali Car Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co. Westinghouse Tr. Br. Co.

Brakes, Magnetic Rail Cincinnati Car Co.

National Paving Brick
Mfrs. Asso.
Brick, Vitrified
National Paving Brick
Mfrs. Asso.

Brushes, Carhon
General Electric Co.
Morganite Brush Co., Inc.
National Carbon Co.
Stackpole Carbon Co.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co., Inc.
National Carbon Co.

Brushes, Metal Graphite National Carbon Co.

Brushholders General Electric Co. Bulkheads Haskelite Mfg. Corp.

Bunkers, Coal American Bridge Co. Buses

Cummings Car & Coach Co. General Electric Co. Graham Bros. International Harvester Co. Six Wheel Co. Yellow Truck & Coach Co.

Bus Lighting National Ry. Appliance Co Bushings. Case Hardened and Manganese Bemis Car Truck Co. Brill Co., The J. G. Cincinnati Car Co.

Cables (See Wires and Cables)

Cambric Tapes. Yellow and Biack Varnish General Electric Co. Irvington Varnish & Ins. Co. Co. Mica Insulator Co.

Carbon Brushes (See Brushes, Carbon) Carbon Plates. Welding National Carbon Co. Carbon Paste, Welding National Carbon Co. Carbon Rods, Welding National Carbon Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safrty Switches Consolidated Car Heating Co. Westinghouse E. & M. Co.

Car Steps, Safety Cincinnati Car Co. Irving Iron Works

Car Wheels, Rolled Steel Bethlehem Steel Co.

Cars. Dump Brill Co., The J. G. Differential Steel Car Co.

Cars, Gae-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
Cars, Gas, Rali
Brill Co., The J. G.
Care, Passenger, Freight,

Brill Co., The J. G.
Care, Passenger, Freight,
Express, etc.
Americao Car Co.
Brill Co., The J. G.
Cincinuati Car Co.
Cumminga Car & Coach Co.
Kuhlman Car Co., G. C.
Thomas Car Works, Perley

Wason Mfg. Co. Cars, Second Hand Electric Equipment Co.

Cars, Self-Propelled
Brill Co., The J. G.
Castings, Brass Compesition
or Copper
Anderson Mig. Co.,
A. & J. M.
Cincinnati Car Co.
National Bearing Metala
Corp.

Castings, Gray Iron and Steel American Brake Shoe & Foundry Co.
American Steel Foundries American Bridge Co.
Bemis Car Truck Co.
Standard Steel Works

Castings. Malleable & Brase American Brake Shoe & Foundry Co. Bemis Car Truck Co. Catchers and Betrievers,

Trolley
Earll, C. I.
Elec. Service Supplies Co.
Chio Brass Co.
Wood Co., Chas N. Catenary Construction Archboid-Brady Co.

Ceiling Car Haskelite Mfg. Corp. Ceilings Plywood Panels Haskelite Mfg. Corp.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co. Change Trays Cincinnati Car Co.

Circuit-Breakers
Anderson Mig. Co.,
A. & J. M.
General Electric Co.
Roller Smith Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables Elec. Ry. Equipment Co. Elec. Service Supplies Co. Hubbard & Co. Ohio Brass Co. Westinghouse E. & M. Co.

Cleaners Oakite Products, Inc.

Cleaners and Serspers Track (See also Snow-Plows, Sweepers and Brooms) Brill Co., The J. G. Ciucinnati Car Co. Long Mfg. Co. Root Spring Scraper Co.

Clutches Long Mfg. Co. Coil Banding and Winding Machines Elec. Service Supplies Co. Westinghouse E. & M. Co.

Colls. Armature and Field Ellioit Thompson Co. General Electric Co. Westinghouse E. & M. Co.

Coils, Choke and Kicking Elec. Service Supplies Co. General Electric Co. Westingbouse E & M. Co.

Coin Changers
Johnson Fare Box Co. Coin Counting Machines Cleveland Fare Box Co International Register C Johnson Fare Box Co.

Coin Sorting Machines Cleveland Fare Box Co. Johnson Fare Box Co. Coin Wrappers Cleveland Fare Box Co. Commutator Slotters Elec. Service Supplies Co. Westinghouse E. & M. Co. Wood Co., Chas. N.

Commutatore or Farts General Electric Co. Westinghouse E. & M. Co.

Compressors, Air General Electric Co. Sullivan Machinery Co. Westinghouse Tr. Br. Co. Compressors, Gas Sullivan Machinery Co. Compressors, Portable Sullivan Machinery Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co. Condensor Papers Irvington Varnish & Ins. Co.

Connectors, Solderless Frankel Connector Co. Westinghouse E. & M. Co.

Concectors, Trailer Car Consolidated Car Heating Co. Elec. Service Supplies Co. Ohio Brass Co.

Controllers or Parts
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co. Converters, Rotary General Electric Co. Westingbouse E. & M. Co.

Copper Wire American Brass Co American Steel & Wire Co. Anaconds Copper Mining Co.

Copper Wire Instruments, Measuring, Testing and Recording American Brass Co. Anaconda Copper Mining Co.

Cord. Bell, Trolley, Register
American Steel & Wire Co.
Brill Co.. The J. G.
Elec. Service Supplies Co..
International Register Co.
Roebling's Sons Co.. John A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and

Cord Connectors and
Couplers
Elec. Service Supplies Co.
Samson Cordsre Works
Wood Co., Chae, N.
Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Traction
Brake Co.

Cowl Ventilators Nichols-Lintern Co. Crance, Hoists & Lifts
Electric Service Supplies Co.

Cross Arms (See Brackets) Crossing Foundations International Steel Tie Co.

Crossings
Ramano Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Frogs & Switches Ramapo Ajax Corp. Wm, Wharton, Jr. & Co.

Wm. Wharson, See Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co. Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse, E. & M. Co.

Curtains & Curtain Fixtures Brill Co., The J. G. Edwards, C. M. Cutting Apparatus
General Electric Co.
Ohio Brass Co.
Raliway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Electrical &
Mfg. Co. Dealer's Machinery & Second Hand Equipment Cincinnati St. Ry. Co. Electric Equipment Co. J. W. Gerke Ieving S. Van Loan Corp. Rennolds Euipment Co. Salzberg Co., Inc., H. E. Susquehanna Traction Co.

Derailing Devices (See also Track Work)

Derailing Switches Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co. Detective Service Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.,
Consolidated Car Heating Co.,
National Pneumatic Co.,
Safety Car Devices Co.

Doors & Door Fixtures Brill Co., The J. G. Cincinnati Car Co. Edwards, O. M. Hale-Kilburn Co.

Doers. Folding Vestibule National Pneumatic Co. Safety Car Devices Co.

Drilla, Rock Sullivan Machinery Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Chio Brasa Co.

Dryers, Sand Electric Service Supplies Co. Caro Brass Co. Westinghouse E. & M. Co.

Ears
Electric Service Supplies Co.
General Electric Co.
Ohlo Brasa Co.
Westinghouse E. & M. Co.

Electric Grioders
Railway Trackwork Co.
Electric Rivet Heaters
American Car & Fdry, Co.

Electrical Wires and Cables Amer. Electrical Works. American Steel & Wire Co. John A. Roebling's Sons Co.

Railway Trackwork Co.
Una Welding & Bonding Co. Electrodes, Steel

Railway Trackwork Co. Una Welding & Bonding Co. Una Welding & Bonding Co.
Engineers, Consulting, Coetracting and Operating
Beeler, John A. Bernam, Inc.
Falle & Co., E. H.
Ford, Bacon & Davie
Hemphill & Wells
Holst. Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
McGovern, Halsey
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp., The J. C.
Engineers, Inspecting &

Engineers, Inspecting & Chemists
Pittsburgh Testing
Laboratory

Enginee, Gas, Oil or Steam Westinghouse E. & M. Co Engines, Gasoline Waukesha Motor Co. Exterior Side Panels Haskelite Mfg. Corp.

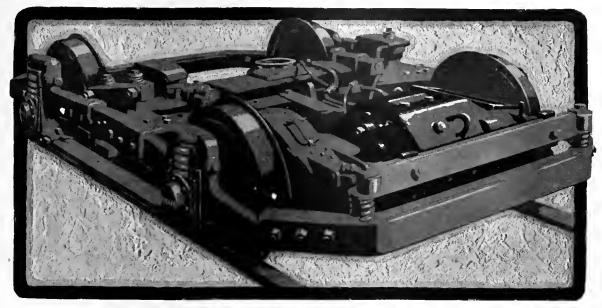
Fare Boxes
Cieveland Fare Box Co.
Johnson Fare Box Co.
National Cash Register Co.
Chuer Fare Register Co.
Percy Mfg. Co.

Fare Registers
Electric Service Supplies Co.
Johnson Fare Box Co.
National Cash Register Co.

Pences, Woven Wire & Fence Posts Acme Wire Co. American Steel & Wire Co. American Steel & Wife Co.
Fenders and White Guards
Brill Co.—The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Root Spring Scraper Co.
Star Brass Works
Wood Co., Chas. N.

Fibre and Fibre Tubing Westinghouse E. & M. Co.

TIMEN Tapered Roller



BEARINGS

"More than anti-friction bearings," Timkens protect journals and armature shafts against friction, thrust, shock and speed. Most wear-protection least cost for lubricant, power and labor. More car miles. More rider satisfaction. More passenger miles. In electric railway statistics of the near future Timken Bearings are destined for a very important place. These are a number of unmistakable signs of it:

At the 1927 A. E. R. A. convention every one of the ten electric cars exhibited with anti-friction bearings had Timken Bearings.

In all other types of rolling stock for revenue transportation — from rail-road sleeping cars to buses — Timken Bearings clearly prevail.

Progressive management everywhere is specifying Timken Bearings in new equipment.

THE TIMKEN ROLLER BEARING CO. C A N T O N , O H I O

Field Coils (See Coils) Flashlights
National Carbon Co. **Floodlights** Elactric Service Supplies Co General Electric Co. Floor, Sub Haskelita Mfg. Corp.

Flooring itus Tuco Products Flonring Car Tuco Products Flooring, Fireproof Irving Iron Works Flooring, Non-Slipping Irving Iron Works Flooring, Open Steel lrving Iron Works Flooring, Steel Subway lrving Iron Works Flooring, Ventilating lrving Iron Works

Floors Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works

Frogs & Crossings, Tee Rail Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co. Frogs, Track (See Track Work)

Frogs. Trolley
Electric Service Supplies Co
General Electric Co.

Ohio Brass Co.
Westinghouse E. & M. Co.
Fuses and Fuse Boxes
Consolidated Car Heating Co
General Electric Co.
Westinghouse E. & M. Co. Gas Electric Drive for Buses General Electric Co.

Gaskets Westinghouse Tr. Br. Co. Gasoline Standard Oil Co. Texas Co., The

Gas Producers Westinghouse E. & M. Co

Gates, Car Brill Co., The J. G. Cincinnati Car Co. Gear Blanks
Brill Co., The J. G.
Standard Steel Works

Gear Cases
Chillingworth Mfg. Co.
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Electric Service Supplies Co
General Electric Co.
Nat'l Ry. Appliance Co.
R. D. Nuttall Co.
Tool Steel Gear & Pinion

Generators
General Electric Co.
Lecce Neville Co.
North East Electric Co.
Westinghouse E. & M. Co. Girder Balls
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs) Grating, Steel Suhway Irving Iron Works

Greases (See Labricants)
Texas Co.. The
Grinders & Grinding Supplies
Metal & Thermit Corp.

Grinders, Portable Railway Trackwork Co.

Grinders, Portable Electric Railway Trackwork Co.

Griuding Bricks and Wheels Railway Trackwork Co.

Guard Ball Clamps Ramapo Ajax Corp.

Guard Ralla, Tee Rail & Manganeae Ramapo Ajax Corp. Wm. Wharton, Jr. & Co. Guards, Trolley
Elec. Service Supplies Co.
Ohio Brase Co.

Barps, Trolley
Elec. Service Supplies Co.
National Bearing Metals
Corp.
R. D. Nuttall Co.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.

Guide Motor Lamp Co. Ohio Brass Co.

Beadilning Haskelite Mfg. Corp. Heaters, Bus Nichols-Lintern Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heat. & Lts. Co.
Railway Utility Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and
Water
Smith Heater Co., Peter

Heaters, Car Stove Smith Heater Co., Peter Heaters, Electric Rivet American Car & Fdry. Co.

Helmets, Welding Railway Trackwork Co. Una Welding & Bonding Co. Holsts, Portable Sullivan Machinery Co.

Hose, Bridges Ohio Brass Co. Hose, Pneamatle
Westinghouse Traction
Braka Co.

Ignition Units
Leece Neville Co.
North East Electric Co. Industrial Tractors
International Harvester Co.

Inspecting Engineers & Chemists.
Pittsburgh Testing Laboratory

Laboratory
Instruments, Measuring,
Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Roller Smith Co.
Westinghouse E. & M. Co. inaulating Cloth, Paper and

Tape
General Electric Co.
lrvington Varnish & Ins.
Co.
Mica Insulator Co. Okonite Co. Okonite-Callender Cable Co. Westinghouse E. & M. Co.

insulating Slik
Irvington Varnish & Inc.

Irvington various Co.
insulating Varnishes
Irvington Varnish & Inc.
Co.
insulation (See also Paints)
Placific Ry. Equipment Co.

Electric Ry. Equipment (
Elec. Service Supplies Co
Irvington Varnish & Ins.

tosulation Slots Irvington Varnish & Inc.

Elec. Service Supplies Co. Hubbard & Co. Ohio Brase Co.

Ohio Brass Co.

Insulators (See also Line
Materials)
Elec. Ry. Equipment Co.
Elec. Servica Supplies Co.
General Electric Co.
Irvington Varnish & Ins.
Co.
Ohio Brass Co.
Weatinghouse E. & M. Co.
Interlor Sida Linings
Haskelite Mfg. Corp.
Jacks (See also Cranns.

Jacks (See also Cranes, Hoists and Lifts) Buda Co., The Elec. Service Supplies Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. O.
Cincinnati Car Co.
SKF. Industries, Inc.

SAF. INGUSTIES, INC.
Lamp Guards and Fixtures
Elec. Servica Supplies Co.
Westinghouse E. & M. Co.
Lamps, Arc & Incandescent
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker Elec. Service Supplies Co. Nichols-Lintern Co.

Lanterns, Classification Nichole-Lintern Co. Letter Boards Cincinnati Car Co. Haskelite Mfg. Corp.

Lighting Fixtures, Interior Electric Service Supplies Co. Guide Motor Lamp Co.

Lighting Systems
Leeca Neville Co.
North East Electric Co. Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Line Material (See also
Brackets, Insulators,
Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
National Bearing Metals
Corn. Corp.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes Wm. Wharton, Jr. & Co.

Locemotives, Electric Cincinnati Car Co. Cummings Car & Coach Co. General Electric Co. St. Louis Car Co. Weatinghouse E. & M. Co.

Lubricating Engineers
Standard Oil Co.
Universal Lubricating Co. Lubricants, Oli and Grease Standard Oil Co. Standard Oil Co. Texas Co., The Universal Lubricating Co.

Manganese Parts Bemis Car Truck Co. Manganese Steel Guard Ralls-Ramapo Ajax Corp. Wm. Wharton Jr. & Co.

Wm. Wharton Jr. & Co. Manganese Steel, Speelal Track Work Bethlehem Steel Co. Wm. Wharton, Jr. & Co. Manganese Steel Switches, Frogs and Crossings Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co. Meters (See Instruments)

Mica Insulator Co. Mirrors, Inside & Outside Cincinnati Car Co. Motor Buses (See Buses)

Motors, Electric General Electric Co. Westinghouse E. & M. Co. Motor, Generators & Controls for Electric Buses General Electric Co.

Mutorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Wood Co., Chas. N.

Nuts and Bolts

Bemis Car Truck Co.
Cincinnati Car Co.
Hubbard & Co.

Ohmmeters Roller Smith Co. Olis (See Lubricants) Texas Co., The Omnibuses (See Buses)

Oxy-Acetyleue (See Cutting Apparatus)

Apparatos)
Packing
Westinghouse Traction
Brake Co.
Paints and Varnishes
(Insulating)
Elec. Service Supplies Co.
Irvington Varnish & Ins.
Co.
Paints & Varnishes, Railway
National Ry. Appliance Co.
Panels, Gutside, Inside
Haskelite Mfg. Corp.
Payament Breakers

Pavement Breakers Sullivan Machinery Co. Paving Material
American Brake Shoe &
Foundry Co.

Paving Materials, Vitrified Brick National Paving Brick Mirs.

Assn.

Pickup, Trolley Wire

Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers

Elec. Service Supplies Co.

Wood Co., Chaa. N.

Pinions (See Gears) Plns, Case Hardened, Wood and Iron Ohlo Brass Co. Westinghouse Traction Brake Co.

Pipe National Tube Co. Pipe Fittings Standard Steel Works Westinghouse Tr. Brake Co.

Pilers, Rubber Insulated Elec. Service Supplies Co. Plywood Roofs, Headlinings, Floors, Interior Panels, Bulkheads, Truss Planks Haskelita Mfg. Corp.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co. Pole Reinforeing Hubbard & Co.

Hubbard & Co.
Poles, Metal Street
Bates Expanded Steel
Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.
Truscon Steel Co.
Union Metals Mig. Co., The.
Polea, Tles, Posts, Piling &
Lumber
American Creosoting &
Construction Co.
Bell Lumber Co.
International Creosoting Co.
Naugle Pole & Tle Co
J. F. Prettyman & Son
Poles and Tlea, Treated J. F. Prettyman & Son
Poles and Tlea, Treated
American Crossoting &
Construction Co.
Bell Lumber Co.
International Creosoting Co.
J. F. Prettyman & Son
Poles, Trolley
Elec. Service Supplies Co.
R. D. Nuttall Co.
National Tube Co.
Truscon Steel Co.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Tube Co.
Truscon Steel Co.

Portable Grinders
Buda Co., The
Railway Trackwork Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co.,

Power Saving Devices
National Ry, Appliance Co.

Pressings, Special Steel Cincinnati Car Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Traction

Westinghouse Traction Brake Co. Pumps, Air Lift Sullivan Machinery Co. Pumps, Vacuum Sullivan Machinery Co.

Punches, Ticket International Register Co. Wood Co., Chae. N.

Radiatora Long Mfg, Co. Rail Braces and Fastenings Ramapo Ajax Corp.

Rall Grinders (See Grinders)

Rall Joints
Carnegie Steel Co.
Rail Joint Co. Rail Joints, Welded Lorain Steel Co. Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Rails, Relaying Foster Co., L. B.

Foster Co., L. B.
Ralls, Steel
Carnegie Steel Co.
Foster Co., L. B.
Rallway Safety Switches
Consolidated Car Heating
Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Elec. Service Supplies Co.
Hale-Kilburn Co.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
International Register Co.
Ohmer Fare Register Co.

Reinforcement, Concrete American Steel & Wire Co. Bethlehem Steel Co. Carnegie Steel Co.

Repair Shop Appliances (See also Coll Bandlug and Winding Machines) Elec. Service Supplies Co.

Planers (See Mackine Tools)
Plates for Tee Rall Switches
Ramado Aiax Corp.

Repair Work (See also Colls)
Westinghouse E. & M. Co. Replacers, Car Cincinnati Car Co. Cincinnati Car Co.
Elec. Service Supplies Co.
Resistances
Consolidated Car Heating
Co.
General Electric Co.

Resistance, Wire and Tabe
Westinghouse E. & M. Co.
Retrievers, Trolley (See
Catchers and Retrievers
Trolley)

Trolley)
Rhoestats
General Electric Co.
Westinghouse E. & M. Co.
Rivet Heaters, Electric
American Car & Fdry. Co.
Roller Bearings
Hyatt Roller Bearing Co.
Roofing, Car
Haskelite Mfg, Corp.
Peafa Car and Bus Roofs, Car and Bus Haskelite Mfg. Corp. Safety Control Devices Safety Car Devices Co.

Safety Car Devices Co.
Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintero Co.
Ohio Brase Co.
Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.
Edwards, O. M.
Sash. Metal Car Wiudow

Saah, Metal Car Window Edwards, O. M. Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated Elec. Service Supplies Co.

Brill Co., The J. G.
Fitzjohu Mfg. Co.,
Haskelita Mfg. Corp.
Masa. Mohair Plueh Co.

Seats, Rus Brill Co., The J. G. Hale-Kilburn Cc.

Seats, Car (See also Baitan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Second Hand Equipment
Cincinnati St. Ry, Co,
Electric Equipment Co.
J. W. Gerke
Irving S. Van Loan Corp.
Rennolds Equipment Co.
Salzberg, Inc., H. E.
Susquehanna Traction Co.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Shock Absorbers
Cleveland Pneumatic Tool
Co., The

Shovels

Brill Co., The J. G.

Hubbard & Co.

Shovels, Power Brill Co., The J. G. Side Bearings (See Bearings Center and Side) Signals, Car Starting Consolidated Car Heating

Co.
Elec. Service Supplies Co.
National Pneumatic Co. Signals, Indicating Nichole-Lintern Co.

Signaia Warning American Strombos North East Electric Co.

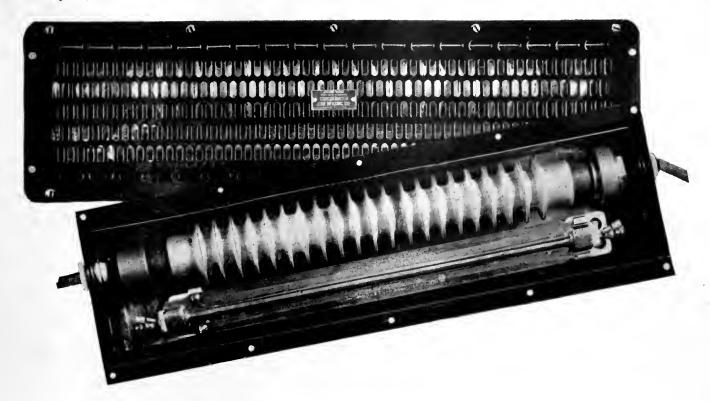
North East Electric Co.
Signal Systems, Block
Elec. Servica Supplies Co.
Nachod and United States
Electric Signal Co.
Wood Co., Chas. N.
Signal Systems, Highway
Crossing
Nachod and United States.
Electric Signal Co.
Wood Co., Chas. N.
Slack Adjusters (See Brake
Adjusters)

Adjusters)
Slect Wheels and Cutters
Anderson Mfg. Co.,
A. & J. M.
Cincinnati Car Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Bearing Metals
Corp.

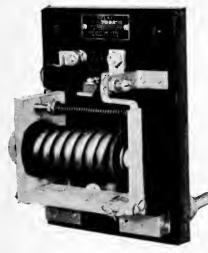
Corp. R. D. Nuttall Co.

Smokestacks, Car Nichols-Lintern Co.

Snow Plews
National Ry. Appliance Co.



A new development in Car Heating The Motor Resistor Heater



The Peak Load Relay

This is in the resistor heater circuit—When the motor resistor heaters are in operation—or when the car is being operated with the resistance in the motor circuit—the peak load relay is energized and short circuits the magnetic switch controlling the regular heaters, thus cutting them out. If the temperature of the car is below that st which the thermostat would cut the heaters out, they will come into service again automatically as soon as car motors cease to run on resistance.

A new heater perfected by Consolidated that utilizes the waste heat in the motor resistance control system!

Used in conjunction with the usual type of car heaters this new Consolidated Motor Resistor Heater makes possible great savings in the consumption of energy for car heating.

The usual type of heaters, which pull their "juice" from the line, are automatically cut out at all times when the Motor Resistor Heaters are in operation. And when the Motor Resistor Heaters are not in operation, the standard heaters are in use except when they are cut out by their thermostatic control.

The Motor Resistor Heater removes the load of the usual type of car heaters from the peak load period of the power plant!

Investigate this almost revolutionary development in car heating! Get the details showing how they simultaneously reduce the power plant peak load and hourly consumption of car heaters! You will be under no obligation.

CONSOLIDATED CAR-HEATING CO.

NEW YORK

ALBANY, N. Y.

CHICAGO

WHAT AND WHERE TO BUY—Continued from page 140

Snow-Piows, Sweepers and Brooms
Brooms
Bril Co., The J. G.
Consolidated Car Fender Co.
Cummings Car & Coach Co.
Root Spring Scraper Co. Snow Sweeper, Rattau J. G. Brill Co. Soldering and Brazing
Apparatus (See Welding
Processes and Apparatus) Solderless Connectors Frankel Connector Co. Special Adhesive Pupers Irvington Varnish & Ins. Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co. Wm. Wharton, Jr. & Co Speedometers North East Electric Co. Spikes
American Steel & Wire Co. Splicing Compounds
Westinghouse E. & M. Co.
Splicing Sleeves (See Clamps
and Connectors) Springs
National Ry. Appliance Co. Springs, Car and Truck
American Spiral Spring Co.
American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Berill Co., The J. G.
Cincinnati Car Co. Cincinnati Car Co.
Taylor Electric Truck Co.
Standard Steel Works
Sprinklers, Truck and Road
Brill Co.. The J G
Cummings Car & Coach Co.
Stair Steps, Safety
Irving Iron Works North East Electric Co.
Steel and Steel Products
American Steel & Wire Co
Carnesie Steel Co. Steps, Car
Brill Co., The J. O.
Cincinnati Car Co.
Irving Iron Works
Stokers, Mechanical
Babocck & Wilcox Co.
Westinghouse E. & M. Co Stop Signals
Nichols-Lintern Co.
Storage Batteries (See Batteries, Storage) Strain Insulators
Anderson Mfg. Co.,
A. & J. M.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Street Cars (See Cars, Passenger, Freight, Express) Cummings Car & Coach Co. Superheaters
Babcock & Wilcox Co. Sweepers, Snow (See Snow Plows, Sweepers and Itrooms) Switches
General Electric Co. Switch Stands and Fixtures Ramapo-Ajax Corp. Switches, Selector Nichole-Lintern Co. witches and Switchboards Consolidated Car Heating Co. Elec. Service Supplies Co Westinghouse E. & M. Co witches, Tee Rail Ramapo-Aiax Corp. Switches, Track (See Track Special Work Synchroscopes Roller Smith Co. Tampers, Tle Railway Trackwork Co. Tapes and Cloths (See Inso lating Cloth, Paper and Tape) fee Rail Special Track Worl Ramapo-Ajax Corp. Telephones and Parts
Elec. Service Supplies Co Telephone & Telegraph Wire American Steel & Wire Co John A. Roeblings Sons Co. Testing Instruments (Ser Instruments, Measuring, Testing, etc.) Thermostats
Consolidated Car Heating Co. Gold Car Heating & Light ing Co. Railway Utility Co. Smith Heater Co., Peter Ficket Choppers and
Destroyers
Elec. Service Supplies C. Tickets & Transfers
Globe Ticket Co., The Tie Rods, Die-Rolled Witherow Steel Corp. Ties and Tie Rods, Steel Carnegie Steel Co. International Steel Tie Co. Tles, Mechanicai Dayton Mechanical Tie Co. Ties, Wood Cross (See Pol-Ties, Posts, etc.) Tires
Firestone Tire & Rubber Co.
Fisk Tire Co., The
General Tire Co., The
Goodrich Rubber Co., The

Goodyear Tire Co., The Kelly Springfield Tire Co. Tokens
Johnson Fare Box Co. Fongue Switches Wm. Wharton, Jr. & Co. roois, Track & Miscelta-neous American Steel & Wire Co Elec. Service Supplies Co Hubbard & Co. Railway Trackwork Co Ramapo-Ajax Corp. Tower Wagons & Auto Trucks McCardell Co., J. R. Fowers and Transmission Structure Structure
American Bridge Co.
Bates Expanded Steel
Truss Co.
Westingbouse E. & M. Co Track Grinder Metal & Thermit Corp. Railway Trackwork Co Ramapo-Ajax Corp. Track, Special Work
Buda Co., The
Ramado Ajax Corp. Trackless Trolley Cars Brill Cn., The J. G Transfer Issuing Machines Ohmer Fare Register Co. Fransformers
General Electric Co.
Westinghouse E. & M. Co. Treads, Safety Stair, Car Step Cincinnati Car Co Irving Iron Works Tree Wire
Bridgeport Brass Co.
Okonite Co.
Okonite-Callender Cable Co. Trolley Bases National Bearing Metals National Dearing
Corp.
R. D. Nuttall Co.
Ohio Brass Co.
Frolley Bases, Retrieving
R. D. Nuttall Co.
Ohio Brase Co. Frolley Buses

Brill Co., The J. G.
Westinghouse E. & M. Co Westinghouse E. & M. Co Trolley Material, Overhear Anderson Mfg. Co., A. & J. M. Elice, Service Supplies Co General Electric Co. National Bearing Metals Corp. Ohio Brass Co. Westinghouse E. & M. Co. Tralley Wheel Bushings National Bearing Metals Corp. Star Brass Works

Trolley Wire

Amer. Electrical Works

American Brass Co.

American Steel & Wire Co

Anaconda Copper Min. Co.

Roebling's Sons Co., J. A Froeks, Car Bemis Car Truck Co. Brill Co., The J. G. Cincinnall Car Co. Cummings Car & Coach Co. Taylor Electric Truck Co. Trucks, Motor International Harvester Co. White Company Truss Planks Haskelite Mfg. Corp. Tubing Steel National Tube Co. fubling, Yellow and Black Flexible Varnish Irvington Varnish & Ins Turbines, Steam General Electric Co. Westinghouse E. & M. Co Turntables Elec. Service Supplies Co Turnstlies
Elec. Service Supplies Co
Perey Mfg. Co., Inc. Valves Ohio Brass Co. Westinghouse Tr. Br Co Varnished Papers and Sitk-lrvington Varnish & Ins Co Ventilators, Car Brill Co., The J. G Cincinnati Car Co Consolidated Car Heating Nichols-Liotern Co. Nat'l, Ry. Appliance Co Railway Utility Co Vestibule Linings Haskelite Mfg. Corp. Voltage Regulators North East Electric Co. Voltmeters Roller Smith Co. Welded Rall Joints
Metal & Thermit Corp.
Railway Trackwork Co
Una Welding & Bonding Co Welders, Portable Electric General Electric Co.

onno Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co. Welders, Rull Joint General Electric Co. Ohio Brass Co. Railway Trackwork Co

frolley Wheels (See Wheels | Welding Processes and Apparatus Veiding Processes and Apparatus Metal & Thermit Corp. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co. Welding, Steel Railway Trackwork Co. Una Welding & Bonding Co. Welding Wire American Steel & Wire Co. Railway Trackwork Co. Roehling's Sone Co., J. A. Welding Wire and Rods Railway Trackwork Co. Wheel Guards (See Fenders and Wheel Guards) Whrel Presses (See Machine Tools) Wheels, Car, Cast Iran Asso. of Mfrs. of Chilled Car Wheels Griffin Wheel Co. Wheels, Car, Steel & Steel American Steel Foundries Bemis Car Truck Co. Carnegie Steel Co Standard Steel Works Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Bearing Metals Corp.
R. D. Nuttall Co.
Star Brass Works Wheels, Wrought Steel Carnegie Steel Co. Whistles, Air
Ohio Brase Co.
Westinghouse E. & M. Co
Westinghouse Tractino
Brake Co. Window Guards & Fittingo Cincinnati Car Co.

Wire Rape American Steel & Wire Co Roebling's Sons Co., J. A Roebling's Sons Co., J. A
Wires and Cables
Acme Wire Co.
Aluminum Co. of America
American Brass Co
American Electrical WorkAmerican Steel & Wire Co
Anaconda Copper Min. Co
Bridgeport Brass Co.
General Electric Co
Kerite Ins. & Wire Cable
Co. Co. Okonite Co. Okonite-Callender Cable Co. Roebling's Sons Co J A Westinghouse E & M. Co

Wood Preservatives
American Creosoting &
Construction Co.

Get the Inside Facts From An Outside Source

P.T.L. Inspectors can give you a complete check on all phases of electric railway construction-a service that keeps you intimately in touch with the quality of all materials going into electric cars, transmission towers, high tension cable, girder rails, etc.

P.T.L. Inspection experts are permanently located in all large production centers and their service is absolutely dependable.

Bulletin 28 gives you the facts. Send for it.

PITTSBURGH TESTING LABORATORY

Pittsburgh

American Steel & Wire Co Roebling's Sons Co., J

Strand

Branch Offices in principal cities

Penna.



Electrical Wires & Cables John A. Roebling's Sons Co. Trenton, N. J. .



Car Heating and Ventilating

—are no longer operating problems. We can show you how to take care of both with one equipment. The Peter Smith Forced Ventilation Hot Air Heater will save, in addition, 40% to 60% of the cost of any other car heating and ventilating system. Write for details.

The Peter Smith Heater Company 6209 Hamilton Ave., Detroit, Mich.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
Abel, G. L. 136 Acme Wire Co. 120 Aluminum Co. of America. 80 American Brake Shoe &	Electric Ry. Equipment Co 36 Electric Service Supplies Co 9 Ellictt Thompson Co 132 Electric Storage Battery Co., The. 63	Laug Body Co. 50-51 Lecce-Neville Co. 77 Long Mfg. Co. 57 Lorain Steel Co. 132	Roller-Smith Co
Foundry 28 American Brass Co., The 102 American Car Co 144 and Third Cover American Car & Foundry Motors Co Insert 53-54-55-56 American Creosoting and Construction Co. 91 American Electrical Works 143 American Steel Foundries 7 American Steel & Wire Co 101 American Strombos Co 133 Anaconda Copper Mining Co 102 Anderson Mfg. Co., Albert & J. M 72 Association Mfgrs, Chilled Car Wheels 113	Faile & Co., E. H	Massachussetts Mohair Piush Co	S.K.F. Industries, Inc. 32 Safety Car Devices Co. 6 Salzberg Co. 11.6. H. E. 135 Samson Cordage Works 38 Sanderson & Porter 130 Searchlight Section 134-135-136-137 Shuler Axle Co. 128 Six Wheel Co. 128 Silver Lake Co. 128 Smith Heater Co. Peter 142 Stackpole Carbon Co. 84 Standard Oil Co. 95 Standard Steel Works Co. 104-105 Star Brass Works 132 Stevens & Wood, Inc. 130 Stone & Webster 130 Stucki Co. 71 Susquehanna Traction Co. 136
Babcock & Wilcox Co	Goodrich Rubber Co	National Carbon Co	Taylor Electric Truck Co
Buchanan & Layng Corp130 Buda Co31 Carnegie Steel Co100	Hemphill & Wells 130 Holst Englehardt W 130 Hubbard & Co 85 Hyatt Roller Bearing Co 25	Oakite Products, Inc	Unia Welding & Bonding Co131 Union Metal Mig. Co., The86 Universal Lubricating Co143
Chillingworth Mfg. Co131 Cincinnati Car Co20-21 Cincinnati Street Railway Co136 Cleveland Fare Box Co132	Illinols Steel Co	Okonite-Callender Cable Company, Inc., The 22 Okonite Co., The 22	Van Loan Corp., Irving137
Cleveland Pneumatic Tool Co	International Harvester Co	Perey Mfg. Co., Inc	"Want" Ads 134-135-136-137 Wason Mfg. Co.144 and Third Cover Waukesha Motor Co 81 Westinghouse Elcc. & Mfg. Co., Second Cover Westinghouse Traction Brake Co
Day & Zimmermann, Inc130 Dayton Mechanical Tie Co., Insert 111-112 Differential Steel Car Co., The 19	Jackson, Walker	Prettyman & Sons, J. F131	Wharton, Jr. & Co., Inc., Wm 108 "What and Where to Buy," 138-140-142 White Eng. Corp., The J. G 130
Earll, C. I	Kelker, DeLeuw & Co	Rail Joint Co. 122 Railway Track-Work Co. 4-5 Railway Utility Co. 37 Ramapo Ajax Corp. 127 Rennolds Equipment Co. 136 Richey, Albert 130	Willard Storage Battery 58 Wish Service, The P. Edw 131 Witherow Steel Corp 124 Wood Co., Chas. N 41
	THE AND THING COVER	Roebling's Sons Co., John A142	Yellow Truck & Coach Co48-49
		Summing entermoner (content or) contract (contract) market (contract	nataaraannuurannuatamuurannuurannuuruunuunuuruuruuruuruuruuruuruu



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

The Universal Lubricating Co.

Chicago Representatives: Jameson-Rosa Company, Straus Bldg.



Reg. U. S. Pat. Office

AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 20-32 West Randolph Street.
Cincinnatt, Traction Bidg.: New York, 100 E. 42nd St.

.



Gets Every Fare
PEREY TURNSTILES
or PASSIMETERS

01101EFEETT00010001700032c007700E0T100210003

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc. 101 Park Avenue, New York City

HASKELITE ROOFS

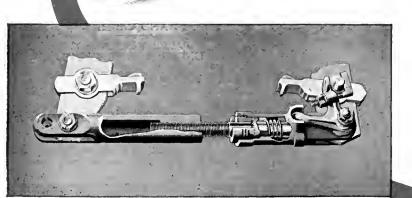
Haskelite Manufacturing Corporation, 133 West Washington Street, Chicago

PLYMETL SIDE PANELS

1927

a year of developments





No. 1006

Brill Automatic (mechanical) Slack Adjuster

A new development which assures positive brake adjustment without further attention during the life of the brake shoes. Applied directly to bottom brake rod where adjustment should logically be made.

Numerous types of Brill Seats, for cars and buses, and for both passengers and operators, have been developed to meet the requirements of every class of service. In comfort and appearance, as well as durability of construction, Brill Seats measure up to the highest standard.



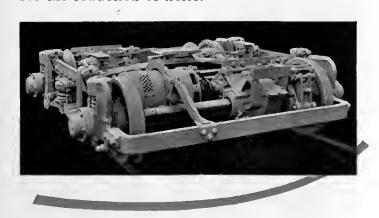




Brill No. 277-EX Truck

In the first place, those features of conventional truck design which contribute to smooth and comfortable riding are embodied in the Brill 277-EX trucks under the "Car for 1928." Solid-forged sideframe, bolster guide, graduated spring system and twin links are among the popular Brill truck features included.

Mounting the motors on the truck frame, instead of the axles, and the use of W-N double-reduction gear units operating in oil are among the innovations introduced for the reduction of noise.



The Car for 1928 Leads the Field

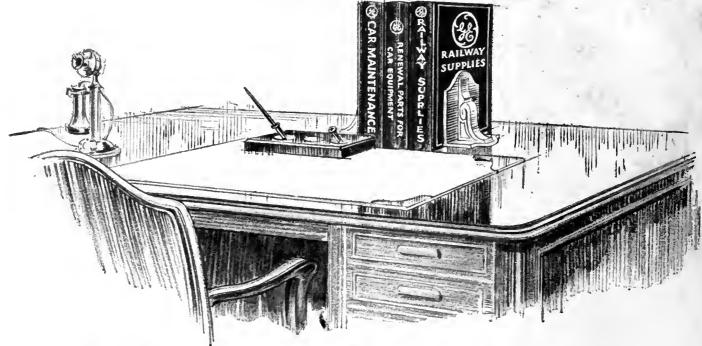
When the story of progress made in electric railway car design during 1927 is transcribed, it will unquestionably set forth the Brill 1928 Model as the outstanding development made for many a year in double-truck electric cars. In appearance, comfort and efficiency it leads them all. Give the public an opportunity during 1928 to demonstrate its appreciation of a type of electric car which attracts riders. More riders mean more revenue, and success.

The J. G. Brill Company
Philadelphia

American Car Company St. Louis

The G. C. Kuhlman Car Co.
Cleveland

Wason Mfg. Company Springfield, Mass.



Modernize - refer to these three books

"Modernize", the operating slogan of today, has at least three applications: Modernize equipment, maintenance, and methods. To help attain these objects, modernize your railway library.

General Electric has compiled three books of highest practical value in *modern* railway operation.

FIRST: Complete Catalog of Railway Supplies. This is an index of modern standards. Use it as a helpful guide to the selection of supplies and equipment.

SECOND: Renewal Parts Catalog compiled individually for each railway company. It lists, describes, and offers duplicates of every equipment part. Use it to assure original equipment quality in maintenance.

THIRD: Maintenance Data Book. This is a compilation of practical experience. Use its suggestions as to the most economical and efficient ways of maintaining equipment and of making repairs or replacements.

Have you this three-book shelf at hand? If so, do you keep it to date by inserting each addition that General Electric sends you?



GENERAL ELECTRIC

MAINTENANCE AND CONSTRUCTION ISSUE

ELECTRIC RAILWAY JOURNAL

:Graw-Hill Publishing Company, Inc.

JANUARY 21, 1928

Twenty Cents per Copy

1928 PAVED TRACK PROGRAMS WILL BE ON A PRODUCTION BASIS

WITH pick and shovel the first paved track was laid. Wood Ties and light rails were used. That construction soon went to pieces. Then came more modern methods. Concrete came in—and was mixed first by hand—then by machinery. Then came air breakers to destroy the old, to aid the pick, to make way for the new. Steel Twin Ties were gaining in favor.

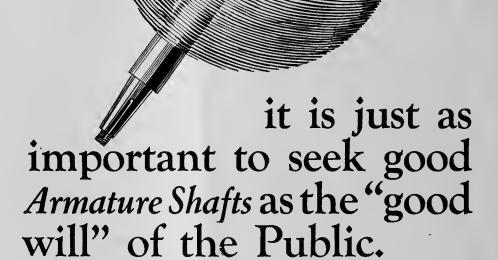
T ODAY track laying machinery in the form of a tie layer and a compression tamper enable paved track to be laid on a production basis. Tony with his pick and shovel has gone—Steel Twin Ties with modern machinery have arrived—making a paved track that is cheaper, better, more lasting than ever before.

THE INTERNATIONAL STEEL TIE CO. Cleveland, Ohio

STEEL TWIN TIE TRACK
THE BASE OF MODERNIZATION

Public Sentiment is the Shaft

about which the Traction World rotates



MODERN railway service is making greater demands on equipment as time goes on and much of this increased burden must be borne by motor shafts.

To meet these new conditions, Westinghouse, at its Homewood renewal parts plant, has developed a line of heat treated and alloy steel replacement shafts that will stand up under the most severe demands of modern service.

Compare the strength of Westinghouse special steel replacement shafts and common axle steel shafts in the following table:

Westinghouse
Renewal Parts
Reduce Maintenance
Costs

	Ultimate Tensile Strength Lb. per Sq. 1n.		Yield Point Lb. per Sq. In.	
•	Guaranteed	Average	Guaranteed	Average
lloy Steel xle Steel, leat-Treated } xle Steel	100,000	117,000	65,000	000,08
	80,000	105,000	50,000	65,000
	75,000	85,000	40,000	45,000
	For bett	er shaft replacemen	ts, call on Westingho	use.

AERA 1928

Mostinghouse Election 9 Manufacture Communication

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of



MORRIS BUCK Managing Editor JOHN A. MILLER, JR. Associate Editor CLARENCE W. SQUIER Associate Editor G. W. JAMES, JR. Assistant Editor

EGIRIC RATIONA

CHARLES GORDON, Editor

HENRY W. BLAKE Senior Editor GEORGE J. MACMURRAY News Editor PAUL WOOTON Washington Correspondent

ALEX McCALLUM Editorial Representative London, England

Vol. 71 No. 3

CONTENTS

JANUARY 21, 1928

Safety Wins!

MEDALS were awarded this week in the Anthony N. Brady Safety Contest. The news of the award appears elsewhere in this issue. The winners were selected from three groups, representing the large, medium and small properties, for outstanding accident prevention and health promotion work on electric railways and their bus subsidiaries.

It is the purpose of ELECTRIC RAIL-WAY JOURNAL to publish in future issues some of the evidence which led the judges to their decision. articles will tell about the up-to-date practices in accident prevention and the results obtained in safety practices by the winning companies. articles will be worth the perusal of every electric railway or bus operator who is interested in the promotion of safety on his property.

McGRAW-HILL PUBLISHING COMPANY, INC. Tenth Avenue at 36th Street, New York, N. Y.

New York District Office, 285 Madison Ave. Cable Address: "Machinist, N. Y." Publishers of

New York District Of James H. MoCraw, President James H. MoCraw, President Malcolm Mule, Vice-President Enward J. Merren, Vice-President Mason Britton, Vice-President Endar Korak, Vice-President C. H. Thompson, Secretary

Washington: National Press Building National Press Dentales CHICAGO: 7 S. Dearborn Street PHILADELPHIA: 1600 Arch St. CLEWELAND: Guardian Building St. Louis: Bell Telephone Building San Franciaco:

SAN FRANCISCO: 883 Mission Street

883 Alieson as London, E. C. 4
London: 6 Bouverie Street, London, E. C. 4
Momber Associated Business Papers, Inc.
Member Audit Bureeu of Circulations

American Machinist
Power
Chemical and Metaliur gleal Engineering
Coal Age
Engineering and Mining Jaurnal
Ingenieria Internacional
Rus Transportation
Electric Rollway Journal
Electrical World
Electrical Merchandising
Raddo Relating
Construction Methods

Electrical West (Published in Son Francisco)

Engineering News-Record
American Mochinist

American Machinist—European Edition
(Published in London)

The annual subscription rate is \$4 in the United States, Canada, Merico, Alaska, Hawaii, Philippines, Porto Rico, Canad Zone, Honduras, Cuba, Nicaragus, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemaia, Chile and Paragusy. Extra foreign postage to other countries \$3 (total \$7 or 28 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Copyright, 1828, by McGraw-Hill Publishing Company, Inc.

Published weekly. Entered as second-class matter, June 23, 1808, at the Post Offica at New York, N. Y., under the Act of March 3, 1876. Printed in U. S. A.

TRANSPORTATION BETTER RAIL, BETTER

To make good cars last do the first thing first

Before you put new cars in service, make your old track serviceable.

Good cars are good only on smooth track.

Even old cars are better on good track.

Keep your grinders and arc welders busy and provide smooth track for a happy New Year.

Complete details on the complete line —get them.



3132-48 East Thompson Street, Philadelphia

Chester F. Gailor, 30 Church St., New York Chas. N. Wood Co., Boston Electrical Engineering & Mfg. Co., Pittsburgh H. F. McDermott, 208 S. LaSalle St., Chicago P. W. Wood Railway Supply Co., New Orleans, La. Equipment & Engineering Co., London Frazar & Co., Japan



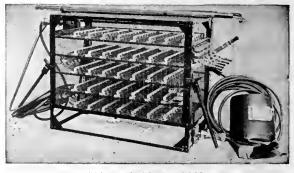
Eureka Radial Rail Grinder



Vulcan Rail Grinder



Reciprocating Track Grinder



"Ajax" Electric Are Welder

D 2347





Timken Bearing Assembly and phosphor bronze contact for shunting the current are shown in cut away view. For listing see O-B Catalog No.20 page 776.

THINK of the essential qualities of a good does affect your net income for better or worse.

Helps Increase the 'Net'

Certainly, in order to increase the "net" and reduce operating expenses, the trolley base must provide a dependable, low resistance current path. It must also exert a uniform pressure on the trolley wire and respond instantly and easily to every variation of overhead and track. Finally, it must give years of efficient service, with little or no time off for attention or repairs. And to facilitate twice-a-year lubrication and inspection, it must have maximum accessibility.

By floating the complete turret assembly on Timkens, providing a large current shunt permanently held in position, and a balanced set of tension and buffer springs-all of these requirements of a good trolley base are fully met in the O-B Form 4.

It swings true and free indefinitely. It minimizes friction and wear, prevents wobble, binding or excessive play, and is exceptionally easy to maintain —at a lower-than-usual yearly cost. With its use you take another step toward saving that 1% in operating expenses that adds nearly 20% to the net.

Ask your O-B Salesman for the details. Or write for Folder 48-C, sent without obligation on request to

Ohio Brass Company, Mansfield, Ohio Dominion Insulator & Mfg. Co., Limited Niagara Falls, Canada 777C



PORCELAIN INSULATORS INE MATERIALS RAIL BONDS CAR EQUIPMENT MINING MATERIALS VALVES

NEW YORK SALES CHICAGO OFFICES:

SAN FRANCISCO

LOS ANGELES

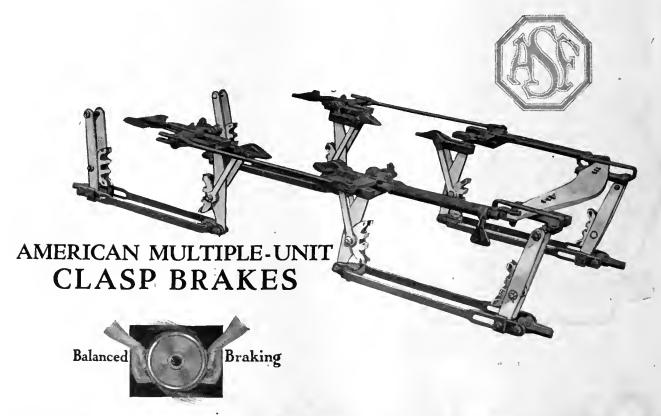
AS LOGICAL AS THE BALANCING OF SCALES



To obtain the unknown weight of an object, by balancing it with known weights was one of the earliest scientific developments. This principle of equalization of forces has had countless practical applications. It is logical.

In the modern railway clasp brake, equal pressure is applied to opposite sides of each wheel, through standard brake shoes, whereas the ordinary practice is to apply the force to one side only. The clasp brake, or balanced braking system, neutralizes the tendency to one-sided wear on journal bearings, pedestals and other truck parts. It affords smoother braking with less heating of brake shoes, and reduces the number of "slid-flat" wheels.

In short—it is the modern and scientific braking system—which is finding increasing favor for heavy traction, and rapid transit service.



AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST.LOUIS



For Your Ready Reference ESSCO Catalog No. 7

To increase your patronage, add attractiveness and efficiency to your cars by selecting your equipment from the broad line of Keystone Car Specialties.

They're all listed, described and illustrated in ESSCO Catalog No. 7.

Send for your copy today!

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver,

Some items found in ESSCO CATALOG No. 7

Golden Glow Head-lights Signals Signals Standard Trolley Systems Hunter-Keystone Standard Trolley Hunter-Keystone Signs Steel Gear Cases Motormen's Seats Lighting Fixtures Headlight Resistances Air Sanders Trolley Catchers Shelby Trolley Poles Rotary Gongs International Fare Registers Registers
Fare Register Fittings
Samson Cordags
Air Valves
Cord Connectors
Trailer Connectors

Harps
Standard Trolley
Wheels
Peerless Coil Winding
Tools
Peerless Armature
Machines
Insulating Materials
Cass Commutator
Stones
Sand Driers
Peerless Pinion Peerless Pinion
Pullers
Employees' Badges
Lins Material Portable Lamp Guards

ELECTRIC SERVICE SUPPLIES CO.



W-N DRIVE

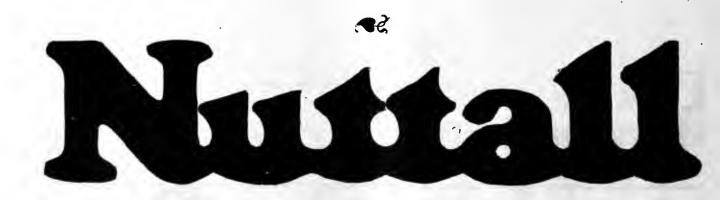
a Westinghouse-Nuttall development for the ultra-modern electric car.

DESIGNED to solve the problem of using lighter weight high speed motors—and does it. High reduction ratio with noiseless, smooth-running helical gears, Timken Roller Bearings, and oil-tight steel case—a combination which offers new possibilities in weight saving, low cost, efficient driving equipment for modern cars.

R.D.NUTTALL COMPANY PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co.
district offices are sales representatives for
Nuttall Railway Products.

Canadian Agents: Lyman Tube & Supply Co., Montreal and Toronto





Modern Traffic Conditions Demand a New Margin of Safety— The Variable Load Brake Provides It

When thoroughfares are crowded... when traffic is congested...when other vehicles are contending for the right of way...when rush hour periods demand quick mass transportation...then, above all times, should adequate operating safety be assured.

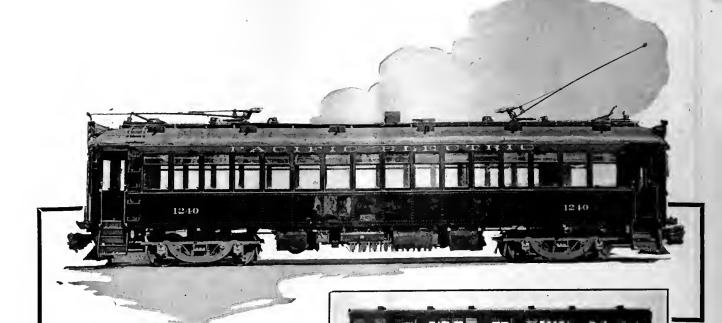
As a means of securing maximum safety for modern intensive city service, the Westinghouse Variable Load Brake stands pre-eminent. It provides a uniform degree of brake effectiveness throughout the entire range of car loading—by automatic adjustment of brake cylinder pressure—and assures consistently short stops for all conditions, inspiring the operator with confidence that he can make good time over the route in perfect safety.

Many traction companies are specifying this improved brake for their new light weight cars—it is needed for strictly modern equipment.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works, WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



Steel Axles

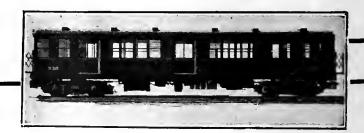
Steel Springs

Armature Shafts

Rolled Steel Wheels



transportation



STANDARD STEEL WORKS COMPANY PHILADELPHIA, PA.

BRANCH OFFICES:

CHICAGO ST. LOUIS NEW YORK HOUSTON PORTLAND



WORKS: BURNHAM, PA.

RICHMOND SAN FRANCISCO ST. PAUL PITTSBURGH MEXICO CITY

The VERSARES/ are coming

With

improved gas-electric drive.

With

every inch of inside space available for passengers.

With

less weight per seated passenger than any other highway transportation vehicle.



With

Duralumin bridge-truss construction.

With

comfortable room for 37 seated passengers and 37 standees.



power, speed, and ease of handling that make light of the toughest schedules.



28 are coming





WHEN a manufacturer wins a very substantial order from one of the most exacting buyers in the industry, in competition with the leading manufacturers in the field. - - his product must have fundamental and obvious advantages.

The Surface Transportation Corporation of New York, one of the associated Companies of the Third Avenue Railway is no idle experimenter. Giving a high standard of service on a five-cent fare means more than ordinarily careful watching of operating costs.

Versare Six-Wheel Highway Units were chosen



to NEW YORK

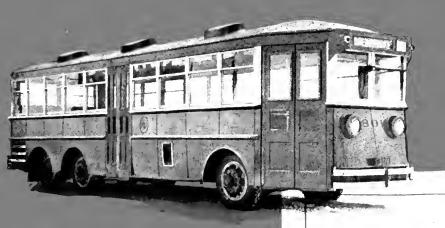
for the Surface Transportation Corporation of New York, one of the subsidiaries of the Third Avenue Railway

because half a million miles of everyday operation have proved the rockbottom economy of the Versare principles and because the Six-Wheel Highway Unit embodies operating advantages found in no other highway vehicle of today.

We call the earnest attention of every progressive executive in the railway industries to the design of these vehicles as outlined in the following pages.



3 are coming



The Versare Six-Wheel Highway Unit has a normal capacity of 37 seated passengers and 37 standees.

With this load there is no crowding and no discomfort.

A six-foot man can stand erect, and with room to spare.

Seated passengers encounter no awkward "humps" in the floor; they find plenty of legroom and ample comfort.

THE ENTIRE VEHICLE HAS BEEN DESIGNED TO UTIL-IZE EVERY INCH OF SPACE FOR PROFITABLE LOAD.



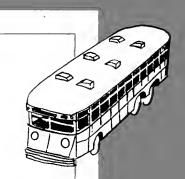
to MONTREAL

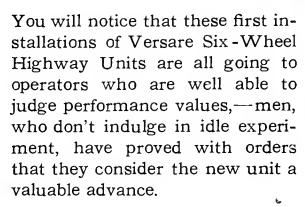


4 are coming

for the Capitol District

Other Versare 6-wheel Highway Units, sold to the Boston Elevated Railway and the Cleveland Railway Company, are now in service.





In the pages which follow this are detailed some of the radical improvements, in design, construc-

tion and operating efficiency, that Versare engineers have achieved. Electric railway operators are asked to study these features carefully; to compare point for point with the needs of the field and the specifications of similar vehicles at present on the road.





O ALBANY

Transportation Company



General Specifications

Heavy duty 6 cylinder 90 hp. for normal Engine:

service.

Heavy duty 6 cylinder 125 hp. for severe

service.

Electrical Versare-Westinghouse Type 177 generator;

Two Versare-Westinghouse 33 hp. vehicle type motors; Westinghouse standard vehicle

control equipment.

Westinghouse Air on four wheels. Mechanical Brakes:

hand brakes on two wheels. Resistor for

electric braking in emergency.

Axles: Versare-Eaton, both front and rear. Patented

Versare Equalizer on rear truck.

Wheels: Van Type 728.

Equipment:

Body: Duralumin truss construction.

Front, 36 in. duplex outward folding. Rear, Doors:

29 in. dual duplex outward folding with or

without Automatic Treadle control.

28 ft. 29 ft. 11 in. } overall. Wheelbase $\begin{cases} 180 \text{ in.} \\ 195 \text{ in.} \end{cases}$ Length:

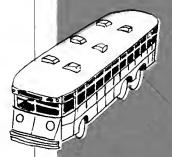
8 ft. overall. Aisle width $\begin{cases} 21 \text{ in. at seat base.} \\ 24 \text{ in. at seat back.} \end{cases}$ Breadth:

9 ft. overall. Headroom 6 ft. 6 in.

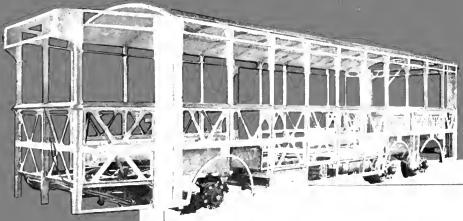
Height:

56 feet. Turning 59 feet. Circle:

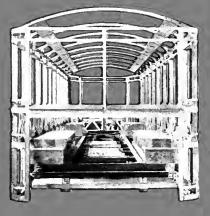




An entirely NEW view cle engineering - - - -



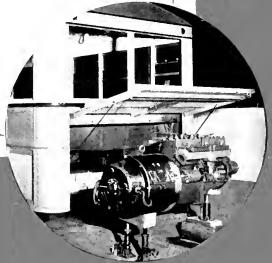
Side view of Versare frame, showing girder construction, extruded side posts, and wheel housings. This entire fabric is of Duralumin and Aluminum.



Rear view of Versare frame showing engine mounting and heavy channels affording protection at corners. When eogine is installed this channelling extends clear across the back behind the bumper.

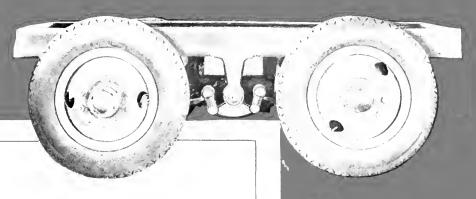
Note especially --

- 1 That the Versare Highway Unit has NO CHASSIS. The body and frame constitute a girder truss member of true bridge form. Versare Eight-Wheel Units of exactly similar design have completed an aggregate of 500,000 miles operation without the expenditure of a penny for body maintenance.
- 2 That the Versare power plant mounted at the extreme rear can be removed and replaced in HALF AN HOUR.
- **3** That the Versare drive motors are



Showing engine installed and manner in which panel lifts up for inspection or removal.

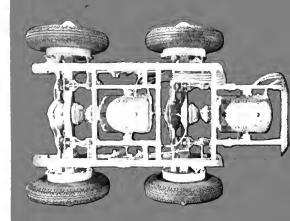
point on highway vehi-



trunnion hung to reduce operating strains.

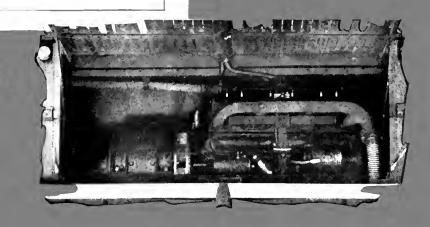
- 4 That the springs of the rear truck are connected through the patented Versare Equalizer to give "floating ease in riding."
- **5** That no engine heat, oil, or fumes can enter the body.
- That the Versare Highway Unit can be handled with the ease of an ordinary car.
- **7** That all units have been designed with a view to rapid low cost maintenance, with a minimum of labor.

Side view of rear truck showing the Versare Patent Equalizer which distributes road shocks over all four springs and achieves "floating ease in riding."

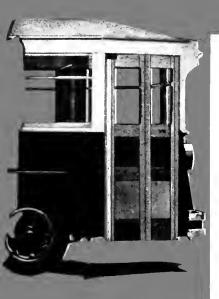


Plan view of rear truck showing arrangement of drive motors and their method of suspension in trunnions.

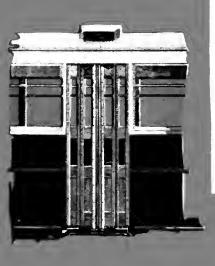
The Versare Westinghouse power plant. Smooth, quiet and amply powerful to give high sustained speed and snappy pick-up. This is in the position of mounting. Note extreme accessibility of all vital parts.



For the rider --- a comfortable - speedy



Showing the low step and wide front entrance to the Versare Six-Wheel Highway Unit. Utmost convenience here, with no waste space.



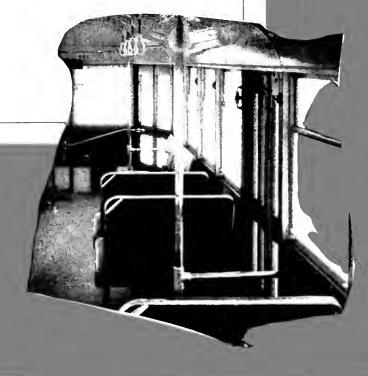
Above, the rear door equipped with automatic treadle.

To right, interior view showing wide aisles, and ample standing room near exit door.

For His Comfort

Wide doors and low steps leading to an interior as spacious and free from obstructions as that of the most modern rail vehicle. Room for a six-foot man to stand without taking his hat off. Seats that are wide and comfortable. No awkward "bulges" in the floor. No seats arranged in unnatural positions. Windows spaced so that every passenger gets an unobstructed view. Sash that opens wide and easily. Hand-holds that call for no stretching or straining, and push-buttons that come to hand naturally. No engine fumes, no vibration, and no noise.

These are the things that win and hold patronage.



new experience in and SAFE TRANSPORTATION

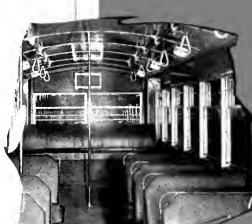


For His Convenience

The "circulating load," in the front and out the rear, with automatic treadle and full safety features. Large destination signs on front and side. The fare box in "just right" position for quick collection. The driver close at hand to make change. No maze of stanchions to walk through. No passengers coming out to block the way.

For His Safety

Four-wheel air-brakes; two-wheel mechanical brakes, and electric regenerative braking through the motors. Ample speed and pickup to maneuver easily in traffic. No tendency to skid. Low step height and full interlocking safety features on doors when equipped with Driver's seat electro-pneumatic control. where he is in full command of entrance and fare box, without turning round. Absence of engine heat and vibration greatly lessens driving fatigue.

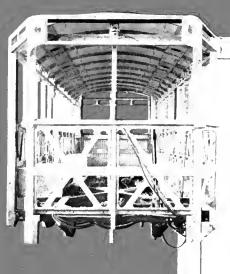


efficient use of the timesaving, comfort-promot-ing "circulating load."

The rear cross seat above the engine. Notice that this is normal and com-fortable in height. Drastic insulation, against noise, heat, and lumes, precludes any trouble from these sources.

Last but not least -

Intelligent planning for maintenance with prac



Front end view of Versare body framework. Note the rigid channelling and girder

Built of Duralumin

Duralumin girders, angles and castings, light yet strong as fine alloy steel. Extruded Duralumin side posts with a tensile strength of 55,000 lbs. Aluminum panels and housings, light and rigid. Such are the modern materials that go to make the most modern of highway vehicles. They cannot rust or corrode, they do not weaken in service.

Rigid, trussed girder construction

Below is shown one section of the side frame of the Versare body. Note the modern trussed girder construction as used by the leading bridge builders. The Versare body and frame combined form a unit of great lateral stiffness and tremendous strength. The first impression of a Versare Unit is always one of absolute rigidity, and freedom from rattles.

Body side-frame unit showing truss construction. Entire units of this type are easily replaced without dismantling the rest of the body.



economical routine tically no depreciation



Interchangeable Units

The body sections of the Versare Six-Wheel Highway Unit are identical with those of the Eight-Wheel Unit. All are interchangeable and easily replaced. Shop time, in case of accident, has been reduced to a matter of hours. A rear or front axle can be replaced in approximately 30 minutes.

Engine replaceable in half an hour

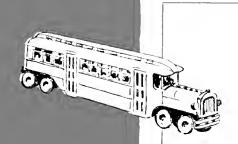
Mounted in the extreme rear, the engine of the Versare Six-Wheel Highway Unit has been made more easily accessible than ever before. The entire rear panel opens for inspection. And the engine itself can be removed and replaced in half an hour without the use of a crane.

Radiators are separate units and need not be disturbed. Ample protection against possible rear-end collision, is evident in the fact that the rear part of the body framing is composed of heavy channel sections and panels, which could be bent only in the event of a very serious accident.

Entrance side view of the Versare 6-wheel Highway Unit showing position of radiators just aft of the rear wheels.



With the EIGHT Wheel Highway Unit and the SIX WHEEL RAIL of progressive transportation in Communities today - - - - - - -



The Versare 8 Wheel Highway Unit

No chassis. Duralumin bridge-type truss construction in accordance with railroad practice.

Body maintenance practically eliminated.

8-wheel double truck mounting.

Versare-Westinghouse type gas-electric drive.

125 hp. 40 KW. Power Plant (79 kw. actually developed).

Low engine speed. (760 r.p.m. average in city service.)

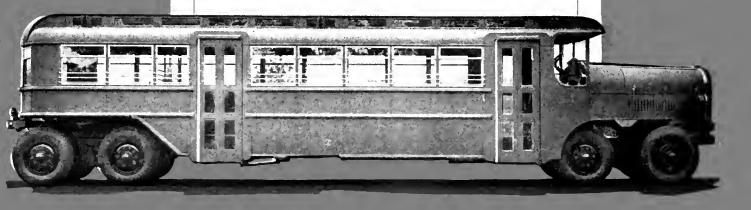
No vibration, Power Plant rubber insulated.

Utmost accessibility.

 $6\frac{1}{2}$ foot head room. Wide aisle space.

Simplified control, extreme ease of handling.

Seats 39 Standees 60.



Unit, the SIX Wheel Highway UNIT Versare covers every need the great majority of American



VERSARE

advises · · · ·

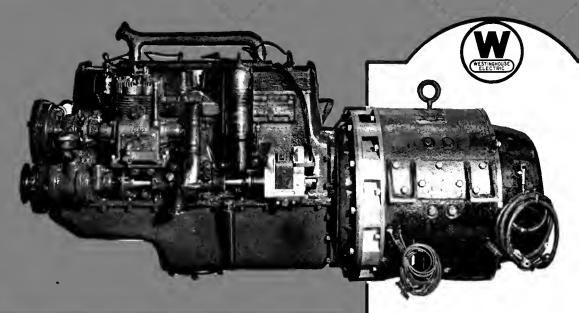
that

a majority of the important features described and illustrated in the foregoing pages are covered by United States Patents applied for, pending, or granted, and are exclusive to Versare Transportation Units.

We shall be very glad to consult with any interested railway operator with a view to adapting Versare principles and designs to his own particular operating requirements.



The Versare Corporation Albany, N. Y.



The Unit Power Plant For Versare Highway Units

NEW opportunity has come

A to bus and electric lines with the advent of the Westinghouse unit power plant for electric

drive.

Because of its smooth acceleration and freedom from vibration, it provides a much more luxurious ride. And the cost is surprisingly low for operating expense and maintenance when compared with other power plants doing the same amount of work.

The complete electrical equipment consists of a Westinghouse type 177 d-c. generator, two Westinghouse type V-92-B motors and a Westinghouse controller.

Westinghouse Electric & Manufacturing Company East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of the United States and Foreign Countries

Westinghouse Direct-Connected Generator



Westinghouse Vehicle Motor

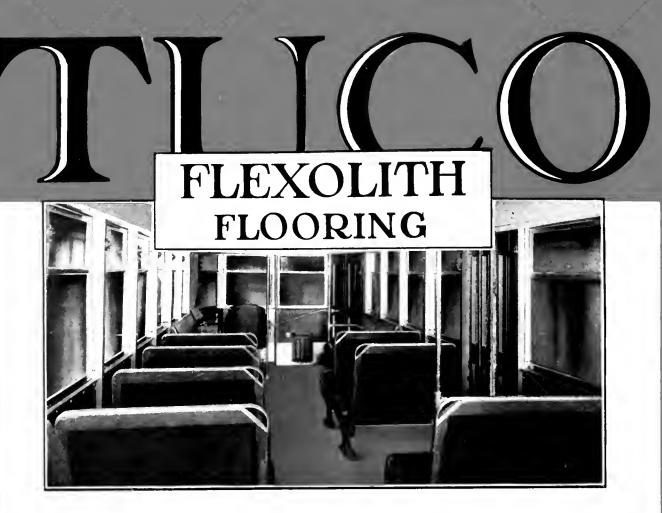


Westinghouse Control

Westinghouse Unit Power Plant Gas-electric Drive Advantages

- Provides simple means of transmitting power from a single prime mover to one or more driving axles.
- Simplifies the duties of the driver in starting and manipulating the vehicle as the clutch and gear transmission are eliminated.
- Smooths the acceleration and provides for maximum starting effort with maximum abuse of the engine.
- Permits operation with the engine at lower average speeds than with straight geared drive.
- Minimizes racing of engine.
- Results in less vibration being transmitted throughout the body of the vehicle
- Reduces engine maintenance.
- Additional safety afforded by electric braking.

Westinghouse



The Flooring Used in the Versare and in all other buses ordered by the Third Avenue Railway Company

FLEXOLITH Special H. W. Mixture is the flooring specified for the Versare and, in fact, for all of the 104 new buses recently ordered by the Third Avenue Railway Company of New York.

The Third Avenue Railway Company has specified Flexolith because their past experience has proven that it is a permanent flooring with a non-

slip tread which requires no mats or coverings and because it is particularly attractive in appearance and is fireproof, sanitary and practically eliminates maintenance.

Used as standard flooring in motor buses and in railway cars of every type. We'll be glad to furnish details on request.

TUCO PRODUCTS CORPORATION

Executive Offices, 30 Church Street, NEW YORK

80 East Jackson Boulevard, CHICAGO, ILL. 915 Olive Street, ST. LOUIS, MO.

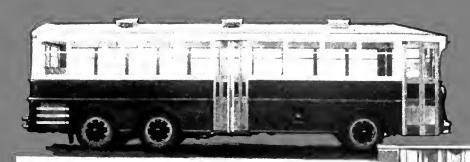
MONTREAL, CANADA ST. PAUL, MINN.

630 Louisiana Avenue, WASHINGTON, D. C. 751 Monadnock Building, SAN FRANCISCO, CAL.

LOUISVILLE, KY. HOUSTON, TEXAS

BOSTON, MASS.

Of Course New York's new Versares will be National Pneumatic equipped



Versare has adopted the "circulating load"

Versare engineers strove to produce a highway transportation vehicle especially for railway use. Naturally they incorporated the most advanced circulating load principles and door operating equipment that the electric railway industry had produced.

It is interesting to note that the first large order for these ultra-modern units should come from the Third Avenue Railway of New York,—a city that has long been served by National Pneumatic Equipment.



National Pneumatic Company

Executive Office, Graybar Bldg., New York

VERSARE CORPORATION



For Efficient and Low-Cost Transportation – **SKF** Ball Bearings

EVERY Versare gas-electric bus that goes into service is standardized on BESF Ball Bearings. On the six and eight-wheel units they are used on the electrical equipment, fan drives and equalizers. On the eight-wheel design these bearings are also used in the patented Versare steering arrangement.

ECSF modestly takes pride in the choice of its bearings for Versare's

newest contribution to modern and more efficient transportation at a profit. Experience in practically every industry throughout the world has proven the leadership of 置足序 Bearings, not on price but on quality and performance well done. In Versare busses this means quiet, smooth and reliable operation with the least attention and no troublesome upkeep.

题CF INDUSTRIES, INC., New York

You men who plan, build, use or pay for machines of any kind, remember this: It costs more to replace a poor bearing than to buy the best that ESSE ever produced. And ESSE Anti-Friction Bearings are the highest priced in the world.

Ball Bearings - Roller Bearings

Nothing is apt to

Nothing is apt to

so much as

cost so much as

a bearing that

cost so little



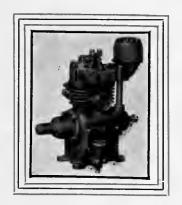
1944



Westinghouse Automotive Air Brakes are a potent factor in promoting the safety and utility of modern automotive vehicles.



The modern Highway Coach and The Westinghouse Air Brake



The Heart of the Air Brake

The Westinghouse Automotive Air Compressor—compact, sturdy, and efficient—supplies air for operation of the brakes, and for the pneumatically-operated doors.

WESTINGHOUSE Automotive Air Brakes are playing an important part in the development of modern highway motor vehicles.

Selection of them as standard equipment on 28 gas-electric coaches for the Third Avenue Railway is a noteworthy recognition of the value of modern braking equipment and its substantial contribution to smooth and effective control.

The Versare Corporation is one of the many leading manufacturers in the automotive industry that have adopted Westinghouse Automotive Air Brakes.

WESTINGHOUSE TRACTION BRAKE COMPANY

Automotive Brake Division: WILMERDING, PENNA.



What appeals more?



Brill Seat Comfort attracts riders—

A large part of the public's interest in any transportation equipment is attracted by its seats. The degree of comfort there found has an important influence upon and in a large measure determines the popularity enjoyed by the entire equipment.

To win public favor, therefore,

and thereby attract necessary patronage to any form of public transportation equipment particular attention must logically be given to its seat comfort. Brill seat comfort attracts riders, and that's why Brill No. 105 Type seats are included in the new Versare Coaches for Third Avenue Railway.





A WORLD'S RECORD

was established by the

CHICAGO SURFACE LINES

in operating 100% of their 3639 Passenger Car Equipments

on December 21, 22 and 23, 1927 during the Christmas Rush Period

The Chicago Surface Lines, incidentally, are operating 502 NP Automatic Treadle Doors

NATIONAL PNEUMATIC COMPANY

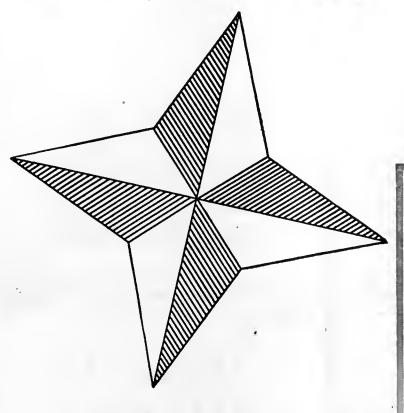
Executive Office: Graybar Building, New York

CHICAGO 518 McCormick Building General Works, Rahway, New Jersey MANUFACTURED IN TORONTO, CANADA, BY Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building



Halving the wet





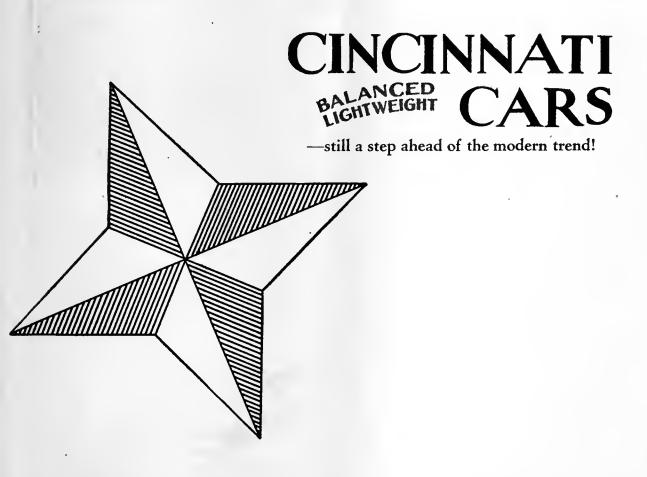
The Cincinnati Duplex Air and Magnetic Brake is one of the four features of the Cincinnati Balanced Lightweight Car which constitute the cardinal points of today's demand for better transportation.

day hazard · · ·

Probably wet and slippery streets will always increase the danger of accidents. But the progressive electric railway operator of today can at least halve the hazard by equipping his cars with the Cincinnati Duplex Air and Magnetic Brake.

Actual tests, both on experimental cars and in service, prove conclusively that deceleration, with the Magnetic Brake on wet or greasy track, is very little less efficient than when the track is clean and dry. On one test, conducted by the Buffalo & Erie on oiled tracks, the stopping distance with the Air and Magnetic Brakes was nearly 60% less than with air alone.

We will be glad to send you results of further tests and other technical data on request.







INDISPENSABLE

For the exposed ends of COMMUTATORS

DOLPH'S RED OIL PROOF ENAMEL won instant acceptance when it was introduced at the recent Iron and Steel Exposition

You know what havoc oil works when it gets down into the mica in the commutator. When you keep this oil where it belongs it means longer life for your commutators and armatures.

True, you have tried all kinds of "friendly advice mixtures," but they all dry out—fail to hold to the copper—crack and finally throw off

THE DOLPH LABORATORIES worked long and hard to perfect RED OIL PROOF ENAMEL for just this purpose. It had to be right before the name "DOLPH" went on the labels. The same broad guarantee that covers every gallon of DOLPH PRODUCTS, goes with this newest one You must be entirely satisfied or you get your money back.

You will note from the above photograph how easy it is to apply DOLPH'S RED OIL PROOF ENAMEL to the commutator while the armature is still in the lathe. RED OIL PROOF ENAMEL air dries with a Hard, Glossy finish.

John C. Dolph Co.

Offices—Laboratory—Works 168 Emmet Street NEWARK, NEW JERSEY

SPECIALISTS ON INSULATION

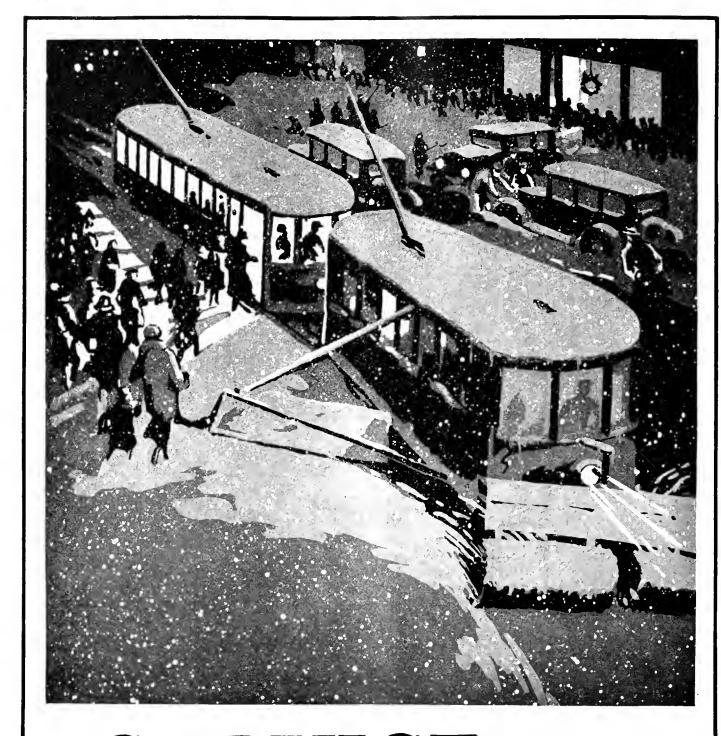
Please send us a quart of DOLPH'S RED OIL PROOF ENAMEL at \$2.00 per quart, delivered at our plant.

Ask us for the best methods of Applying Red Oil Proof Enamel to Commutators.

Red Oil Proof Enamel in one gallon cans is \$6.00 F.O.B. Newark, N. J. This order is subject to Dolph's broad guarantee that if Red Oil Proof Enamel does not prove satisfactory it moy be returned and amount charged will be refunded immediately.

Many industries can use DOLPH'S RED OIL PROOF ENAMEL! It is invaluable in stopping oils leaks in pipes carrying kerosene, benzine and other petroleum products. RED OIL PROOF ENAMEL has proved to be economical satisfactory and a great time saver in Oil Refineries, Packing Houses, Oil Burners, Ship Yards, Chemical Plants. Also

for Plumbers, and Steam Fitters.



SERVICE.. yesterday-today-tomorrow Barron G.Collier Inc.

Candler Bldg.

New York

H-W sales office.

No. 327-M

101 YEARS OF MANUFACTURING EXPERIENCE



Snow sweeper, rattan and cane webbing may be ordered through any

FOR INTERURBAN NEEDS

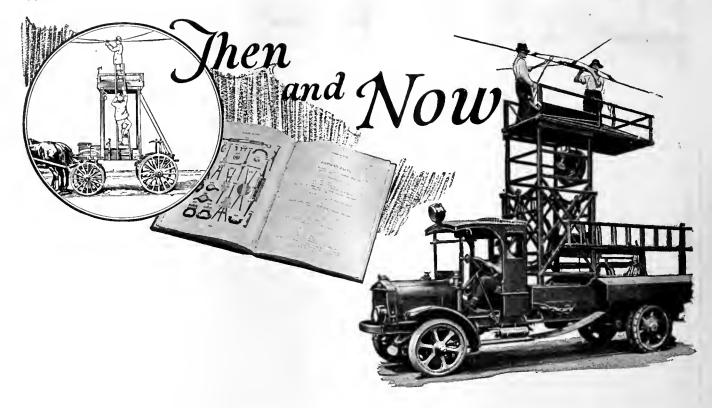
THIS Heywood-Wakefield seat is designed for the modern type of interurban service where comfort is now so important. It has been selected for both new cars and for replacement use.

It has deep, double spring cushions shaped to allow more leg freedom. Mechanism rails are set in. The individual backs are properly pitched for comfort.

Our car seating experts will be glad to help you decide on the best seating equipment for your needs. service is free through any H-W sales office.

> If you have not received a copy of our new Bus Seat Catalogue, write for it.

Heywood-Wakefield Co., Wakefield, Mass.; 516 West 34th St., New York, N. Y.; 439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San Francisco, Cal. The G.F. Cotter Supply Co., Houston, Texas. F. N. Grigg, 630 Louisiana Ave., Washington, D. C. The Railway & Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada.



G-E Line Material the choice

Even when horses drew "high wagons" to the scene of new construction or emergency repairs, General Electric Line Materials were the well-known standard.

The 1896 edition of the G-E Catalog, shown above, suggests interesting comparisons with present-day G-E line devices, which have had the benefit of constant development, improvement, and proper additions during all these years.

Today, the seeker for "quality first" turns to his latest G-E Railway Supply Catalog, where 150 pages are devoted to line material that is thoroughly modern.



In line with General Electric's constant endeavor to simplify and facilitate rail-way maintenance, G-E Line Material has been standardized in a manner that reduces the number of devices to a minimum. This reduces cost and simplifies stock keeping.



Modern Equipment Standards

GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, January 21, 1928

Number 3

Slaying the Four Dragons of Maintenance

SYMBOLIC of the power of evil or of evil itself was the dragon in ancient mythology. Legends were built around heroes who were reputed to have met and slain the dragons. Is it too great a strain on the imagination to picture the modern equipment executive as a Siegmund and the destructive forces as the dragons which he must set out to slay? For that is just what he must do—attack the destructive agencies which beset his rolling stock.

Four dragons lying athwart his path are wear, corrosion, vibration and dirt. Ill appearance and discomfort are allied demons, but with the other four out of the way, it is easy to turn attention to them. The other maintenance demons will succumb only to analysis and deep study.

Look briefly over the four maintenance dragons. Wear is probably uppermost in everyone's mind. Little that can be proposed is new. There is one development to which attention is called, the plating of wearing surfaces with chromium. Quite possibly this process holds possibilities of effecting marked economies.

Corrosion comes next. Steel construction in car building has become practically standard. The underside of a car is subject to the corrosive effects of water spray loaded with salt, alkalies and sometimes acids. Then there always is a coating of dust to retain these destructive agents. Steel sheathing, tee posts and pipes have often been known to corrode to the point of destruction within seven years. Rust-repellent steel has been developed to the point that it is available and its use is advisable. Steel with a copper content of 0.18 per cent shows markedly less corrosion than ordinary steels. Interesting tests on this subject are reported in Vol. 22 and Vol. 23 of the A.S.T.M. *Proceedings*. From them the economy to be obtained by the use of such steel can be determined.

Next comes vibration. It is a dragon of such ferocity that it tests the mettle of any engineer. In fact, it has so many elements of destructiveness that it will be made the subject of a separate editorial. Sufficient here to say that it can be met and overcome.

The fourth dragon is dirt. In the pathway of the equipment man dirt serves but one useful purpose, to show him the loose parts. For this purpose it is of great value. But dirt—meaning grit—is the greatest enemy of wearing parts. If bearings, guides, clevises and similar wearing parts could be protected absolutely against dirt their life would be prolonged greatly. Fenders over car wheels have been used to great advantage to keep dirt from moving parts. Alemite or similar lubricating systems have been used successfully for brake hanger pins and the like so as to form a

grease seal to prevent the entry of grit. As the grease is forced from the inside to the outside clean grease is always present to protect the bearing surfaces and the new grease tends to force out any particles of grit that may have worked in.

So it is not too much to believe that these four dragons can be slain or driven back to their lair. If they are overcome the equipment man will have reached a point far nearer to ultimate perfection and will have obtained not only increased economy but a greater ride sales value for his equipment.

Vibration a Destructive Agency

VIBRATION as a destructive agent is not fully appreciated. This is evident because so little has been done to combat it. It becomes manifest in cracked or broken axles, fatigue and fracture of many other parts throughout the car and track structure, and in noise. If of low frequency it may directly produce discomfort to the car rider. The great trouble with failures due to fatigue of metal, the direct result of continued vibration, is that breakdown does not occur until after the lapse of considerable time. The vibration is all too often looked at as a matter of course and steps are not taken to minimize the evil.

The remedies for vibration, so far as it applies to the maintenance of cars, may be summarized as reduction of gross weight, reduction of unsprung weight, greater care in selection and treatment of steel and other structural materials, more careful construction and cushioning. The factors of weight determine the amplitude of the vibration wave. It is obvious that the lower this amplitude the less will be the destructive action and the greater the life of the structural part.

As to quality of material, first cost is too often allowed to overshadow the value of long life. The question of metallurgy must be given deep thought if the maximum economic value is to be obtained. Often a change to a steel much better adapted to the purpose can be made at little or no additional cost. Likewise more careful engineering in the proportioning of parts is of value. In other words, in ordinary design too much is left to guesswork and rule of thumb methods.

From a construction standpoint, there is much need for closer fits. If wearing parts such as bearings and clevises are well fitted there is little tendency for them to set up vibration with consequent wear, fatigue of metal and noise. For example, a loose fit of an axle bearing not only allows grit to enter, but it permits the bearing to vibrate and add hammering to the normal frictional wear. The vibration within the bearing tends to crystallize it and cause fracture. The vibration is transferred to the armature leads, causing breakage there, and also to the gear case, to bolts and to dozens of other

parts, each in turn suffering for the sin of the loose bearing.

Another constructional feature having to do with vibration is the item of fillets. While fillets cannot stop vibration they certainly minimize its effects by distributing stresses and preventing localized bending. Fillets should be of the largest practicable radius and should be true segments of circles, ending in tangents.

All parts should be machined carefully and fitted tightly. A construction cannot be kept tight if an unfinished casting is bolted or riveted directly to a rolled section, because the contact between the two consists of several points instead of a flat surface. Subsequent vibration is sure to imbed these points into the opposing surface with resultant loosening and added wear, vibra-The only practical way of making a tion and noise. permanently tight joint between unfinished parts is to interpose a layer of soft material such as canvas dipped in linseed oil paint. If the compressive strains are too great for such treatment the sole alternative is careful machining of the parts coming in contact. Another aid to the maintenance of tight fits is use of the new American Standard fine threads. Bolts can be made of better steel and finished under the heads where practicable.

The final element in reduction of vibration is the use of springs and cushions. To be effective springs must absorb much of the vibration. Today much attention is being paid to rubber as a supplement to spring action. It has been used between the halves of elliptic springs, on the end supports of semi-elliptic springs, in center bearings, in quarter bearings and even in wheels. Much of this is in the experimental stage, but it gives promise of real results in the near future. If rubber can be used successfully in wheel construction it will go a long way toward reducing the effective unsprung weight of the car.

In the final analysis vibration means fatigue and rapid ageing of parts, accelerated wear and noise. And noise in turn is the sure signal that something is wrong.

Where the Maintenance Money Goes

QUESTIONS are often asked as to the division of expenditures in the various maintenance departments between materials and labor. While it has been possible to make the segregation for any one company, it never has been done for the industry with any degree of exactness. In the estimate of expenditures for the coming year, published last week, it was possible for the first time to make an accurate division between maintenance materials and maintenance labor. The results are quite decisive as indicating trends and conditions in various railway departments.

The total expenditures on maintenance accounts are divided in the proportion of three-sevenths materials and four-sevenths labor. The underlying reason for this high proportion of labor is, of course, due to track construction, in which the greater portion of the materials, such as sand, rock and paving materials, bulk large. The work of preparing and placing these materials naturally is a major part of the total cost of the work.

In car maintenance the proportion of material is also low, being some 45 per cent. Contrasted with this, the materials for bus maintenance constitute almost 59 per cent of the total. While in general the processes of repair on cars and buses are similar, here is an indication that bus parts are in large measure finely machined

specialties using high-grade materials, while cars include many more foundry and forge shop products of lower grade materials and much rougher finishes.

Obviously there is a field for better car design. While the production of cars is mainly in small orders, there is room for standardization and refinement of parts so that there is less bulk and weight to give needed strength. It may be, of course, that another reason for the higher proportion of labor in car maintenance is due to the manufacture of repair parts in the railway shop, a practice which this paper has always advised against and which is frequently very deceiving in the matter of costs. In any event, the figures indicate that there is a need for further investigation to find if the costs of car maintenance cannot be further reduced by the purchase of more finished parts and the use of less labor, as contrasted with the practice of home manufacture and patching.

Recommendations Growing Out of the I. C. C. Bus Inquiry

INTEREST will run high among all carriers in the reports and recommendations of Attorney-Examiner Flynn of the Interstate Commerce Commission on the subject of the bus and truck engaged in interstate commerce. The findings and conclusions set out in the report are merely tentative. At the hearings more than 5,000 pages of testimony were taken from more than 400 witnesses. This fact is cited merely to indicate the mass of material which had to be considered and to convey an idea of the task before the attorney-examiner in formulating his conclusions.

With these conclusions, in general, there is no cause for quarrel, however much a specific recommendation here and there may be subject to differences of opinion. The conclusions, published elsewhere in this issue, should be read carefully even by those to whom it would now seem they do not apply and by those to whom it would seem they are never likely to apply. It is a changing world and the subject of the motor carrier is by far so big that no one engaged in transportation can afford not to be well informed about the matter and its possible ramifications.

One of the suggestions made is that regulatory intervention by the government is necessary. It is proposed that state regulatory commissions take joint jurisdiction and that joint boards representing two or more states should act when operations extend across one or more state lines, but if the commissions failed to accept authority the Interstate Commerce Commission should act with original jurisdiction. On the decision of such boards, right of appeal to the Interstate Commerce Commission would be allowed. The regulation would apply equally to independent operators and to railroads or public utility companies, and operations would not be allowed until the board had found them necessary in the public interest. Operations begun before March 2, 1925, would be considered as established. If any state refused to apply the regulation, the Interstate Commerce Commission would act for its territory in fixing rates and charges and over the supervision of operation.

Not the least interesting part of the report is the review of the effect of changing conditions on the common carrier. It is significant that during the period since 1921, the number of electric railways reporting to the Interstate Commerce Commission decreased from 312

to 259 in 1926. During the same interval the operating revenue of the electric railways reporting to the commission decreased from \$235,656,072 to \$194,860,470, or 17.31 per cent, and electric railway operating expenses of these properties decreased from \$189,450,749 to \$163,210,222, or 13.85 per cent. The passenger revenue decreased from \$193,166,389 to \$140,536,857, or 27.25 per cent. As Mr. Flynn points out, however, there was a steady increase in freight revenue during the same period. Returns from this source were \$28,585,712 in 1921, and \$39,794,714 in 1926, an increase of 39.21 per cent.

As indicated in an editorial in the Journal for Dec. 31, 1927, the matter of the regulation of interstate buses is again before Congress. At that time, some of the reasons for regulation were reviewed. The concern now is with the contents of the report of Mr. Flynn, and with his thirty recommendations. As he indicated, and as Electric Railway Journal said, public policy demands the fostering and preserving of motor vehicle transportation in its full vigor, but the same public policy requires that there shall be regulation, with a wise, far-sighted and definite co-ordination of all existing transportation agencies—land, water and air.

Better Adjustment for Brush-Holders Will Reduce Motor Trouble

MANY of the troubles experienced in railway motor operation can be traced directly to improper brush-holder action. The defects at the root of the trouble when located appear quite insignificant, but when remedied, a marked improvement in the operation of the motor results.

A surprising fact brought out in the brush-holder survey, results of which are given in this issue, is the large number of types of brush-holders, many of which are unsatisfactory and should be eliminated. Railways with several kinds in service should try to standardize so as to reduce the number on a single property to a minimum. Manufacturers have developed new brush-holders for some of the old type motors in which many of the modern improvements have been incorporated. Use of these improved designs will help minimize brush-holder troubles and insure prompt delivery of renewal parts.

Railway motor maintenance costs are reduced by keeping brush-holders in good condition. Careful attention to some of the points brought out in the brush-holder survey will lengthen the life of brush-holders, carbons and commutators, improve commutation and reduce the tendency to flash between brush-holders and ground. The importance of proper spring pressures has been discussed in these columns at frequent intervals. The survey shows that in general a spring pressure of about 5 lb. per square inch of contact area is good practice. If the brushes spark badly and there is a tendency to flash at high speeds, the spring tension can be raised to between 7 and 9 lb.

Breakage of springs and loss of tension in springs were among the most frequent troubles reported. By keeping braided shunts in good condition, excessive motor current does not go through the spring mechanism and some of the troubles are avoided. When carbon dust or dirt gets into the working parts of a brush-holder, it is sure to work stiffly. Cleanliness and occasional lubrication will do much to insure satisfactory operation.

Spacing of brush-holders and alignment parallel to

the commutator bars should be checked at each inspection. In most types of railway motors brush-holders are aligned with the center line of the pole faces. The distance from the center line of one brush-holder to the center line of the next should be equal to one-quarter of the distance around the face of the commutator. The report from one railway stated that flashing with one type of its motors became so serious that cars could hardly be kept in service for any extended period. Investigation showed that the supporting faces had become so worn that when the brush-holders were installed they were not located correctly in relation to the field coils. Each motor was overhauled and the brush-holders were reinstalled with jigs and fixtures so as to make certain that they were located properly. This remedied the trouble.

The distance of brush-holders from the commutator surface affects the wear of the brushes. In general the under side of the carbon box should be between $\frac{1}{8}$ in. and $\frac{3}{16}$ in. from the face of the commutator. This is important, as it reduces the chattering and the tendency of carbons to break.

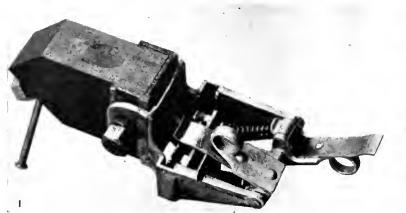
When mounting brush-holders in the motor frame, the pads or seats should be cleaned carefully and all dirt removed in order to insure proper spacing and alignment. In making connections from the wiring around the frame to the brush-holders, the cable leads should have sleeves or terminals, depending on the design of brush-holder. Use of proper connectors is important to keep the connections tight and secure good electrical as well as mechanical contact. Set screws, if used, should be equipped with lock washers and nuts to prevent loosening. When porcelains are used, they should be kept clean and free from dust and dirt so as to provide the necessary creepage distance to ground, otherwise flashing will occur and the burning action will lead to other troubles.

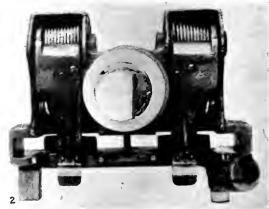
Manufacturers View New Year Favorably

REPORTS on the extent of business done by manufacturers during 1927 differ. Some of those in the local transportation field whose opinions were quoted in the last issue of this paper found sales somewhat slow. They found that the exchange of obsolete for modern equipment anticipated at the beginning of last year was not up to expectations. According to one prominent manufacturer, in some instances local conditions such as pending franchise changes, paving regulations, etc., beyond the control of the railways, undoubtedly accounted for this delay. Others found the year that has just passed satisfactory from a business point of view and several report an increase in sales over 1926 or previous years.

It is notable that the majority of the manufacturers look forward to 1928 with confidence and optimism. Some of them even believe that it will be a record year in the purchase of the kind of equipment they make. A composite expression of their opinions might read that public authorities are realizing more than ever before the need for good transportation and the railway companies themselves know that this can best be given with modern equipment. Hence they believe these coming twelve months will witness a long step in advance in the adoption and use of up-to-date apparatus.

In the main a crystallization of these opinions indicates that the industry's manufacturers may be expected to share in the continued prosperity of the country for 1928 forecast by leaders in other industries.





Various Types of **Brush-Holder Mechanisms**

Used with Railway Motors

Fig. 1-Non-adjustable type Lorain No. 34 motor brush-holder, in which a round steel wire helical spring gives a definite pressure.

Fig. 2—Non-adjustable type of helical spring pressure mechanism for G. E. No. 66 railway motor brushholder.

Fig. 5—A square spindle-type brush-holder with a adjustment in the Westinghouse No. 12-A motor brush-holder.

Fig. 4—Semi-adjustable Lindall "Z" spring type pressure mechanism used with Westinghouse No. 306

railway motor brush-holder.
Fig. 5—A square spindle-type brush-holder with a flat bronze spiral spring is used on the Westinghouse No. 93 motor.

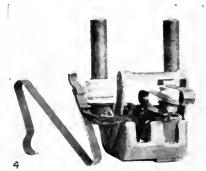
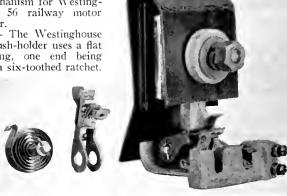


Fig. 6—A hexagonal spindle gives the Westinghouse No. 101-B motor No.

brush-holder six adjusting points in a revolution.

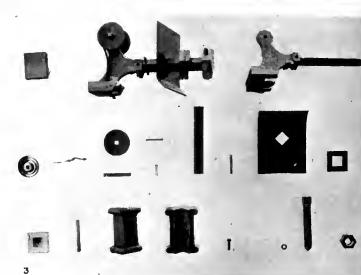
Fig. 7—Worm wheel type adjusting mechanism for Westinghouse No. 56 railway motor

brush-holder.
Fig. 8 — The Westinghouse
No. 322 brush-holder uses a flat spiral spring, one end being secured on a six-toothed ratchet.









Brush-Holder Troubles

And How They Are Overcome

Common practices in brush-holder and carbon brush maintenance are determined from a survey covering 30 properties. Replaceable carbon brush boxes prove economical. Side wear of brushes greater with ventilated motors

ANY factors enter into the efficient maintenance of brush-holders for railway motors. The copper shunts break or burn off, insulators crack or become short circuited, flashing and grounding are most common. Many troubles are caused by conditions apart from the brush-holders themselves, such as the type and quality of carbon brushes used, amount of spring tension, or condition of commutator. To determine some of the problems that come up in connection with brush-holder maintenance and to find out how they are being solved most effectively, a survey of this particular phase of maintenance on 30 electric railway properties was made by this paper.

The results obtained by different practices or methods used to overcome some of the troubles are enlightening. The large variety of brush-holders in service is astounding. One property, operating 137 cars has 23 different types of brush-holders in use, an average of but one type for every six cars operated. On this particular property none of the different brush-holder types can be used in more than one type of motor. Numerous other properties have many types of brush-holders in comparison with the cars operated. One railway with 49 cars had six different types; another operating 103 cars had eight. Others were one company with 166 cars had thirteen types, a second with 227 cars had seven different types, another with 664 cars had nineteen different types. Still another with 407 cars had twelve different types and another with 403 cars had eleven different types. Out of a total of 26 replies in which definite information was given, the number of car equipments per brush-holder varied from 6 to 344. Under the best conditions, one property operating 3,441 cars had ten different types of brush-holders, a second with 2,000 cars had six different types and a third with 2,858 cars had nine different types. The minimum number of types found was on three properties operating 209, 149 and 91 cars respectively. Each has but two different kinds of brushholders. The average for the 26 railways from which the information was obtained showed 92 cars per brushholder type. Of these railways seventeen stated that none of the types could be used in more than one type of motor and nine have types which can be used in two different types of motors. Thus it appears that here is a wide field for standardization.

Of the large variety of brush-holder troubles, those mentioned most frequently are broken springs, worn carbon boxes, broken shunts, flashing and weak springs. Other troubles include grounded, short-circuited, loose and broken insulators, loose shunts, burned and loose springs, broken pressure arms, broken fronts, worn contact tips and dirt back of tension springs.

RIGID INSPECTION ESSENTIAL

Many of the methods cited for overcoming brush-holder troubles can be classed under the general heading of rigid inspection and maintenance. Some of the methods given in replies to a question as to how brush-holder troubles are reduced are as follows: Keeping insulators clean; baking and cementing the insulators in place; careful attention to keeping commutators properly slotted; keeping brush-holders, commutators and fields in good condition; use of a clock-spring type of brush-holder; replacing and adjusting springs at frequent intervals; use of a combination of spring and finger type of brush-holder: improvement in the type of shunt and



Fig. 9—Six-tooth single center-ratchet type adjusting mechanism for Westinghouse No. 306 railway motor brush-holder

connectors used; giving more attention to the removal of worn brushes; use of a new flat coil-type of spring instead of old-style wire springs; shaping the carbon box on a steel mandrel; checking carbon boxes with a limit gage; cutting out the bottom of brush-holders so as to let out dirt; use of renewable carbon ways; replacing armature bearings; frequent checking of brush-holder spacing; keeping brush movement to a minimum; repairing bad track; insulating motor cases; reducing the voltage on old-type motors; testing fields at frequent intervals for short circuits, and stopping the practice of operating down grade with power on.

Many of these practices are common and are included in the general inspection and overhauling of brush-holders of different railways. However, it is evident that more careful attention should be given to these troubles and inspectors should be instructed in the various points to be taken care of to make certain that brush-holder troubles will not occur. Satisfactory operation cannot be expected where the carbon brushes themselves are loose in the brush-holders due to worn conditions or where pressure on the brushes cannot be maintained uniform because the springs need repairs. Careful attention to this particular part of the equipment will bring gratifying results.

Spring Tension Should Not Be Adjusted by Carhouse Men

Railway maintenance men at present seem to be agreed that it is advisable to provide modern brush-holders with some means of adjusting the spring tension. Further, they seem to agree that it is not objectionable—in fact, it is preferable—to remove the brush-holder from the motor in order to make this adjustment. Brush-holders so designed cannot be adjusted readily by carhouse men

so that they will not tamper with the spring tension. Adjustments are then made in the shop by trained work-

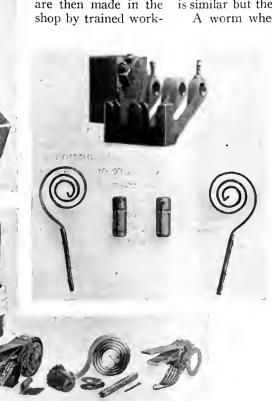


Fig. 10 (Top, left)—The brush-holder of the G.E. No. 21 motor has a ten-tooth ratchet wheel for adjustment.

Fig. 11 (Bottom view)—Fifteen-tooth ratchet-wheel type adjusting mechanism

for Westinghouse No. 306 railway motor brush-holder

Fig. 12 (Top, right)—Barrel and set screw ("Flower") type of brush-holder with ten adjusting notches.

men with proper tools and the most satisfactory operating spring tension maintained. The adjustment is made under the supervision of some responsible head in the shop.

Some of the earlier types of brush-holders, many of which are still in use, have tension springs designed for a fixed pressure without adjustment. Later designs include some means of changing the spring pressure on the pressure finger by winding or unwinding the coiled spring and locking it in position.

Accompanying illustrations show some of the various types of brush-holders. Figs. 1 and 2 are of a non-adjustable type, in which a round steel wire helical spring gives a definite pressure. To change the pressure a new spring with a different number of turns or a different size of wire must he used.

In the brush-holder illustrated in Fig. 3 a flat bronze

spiral spring gives a partial adjustment. To change this within small limits, the spiral spring may be opened or closed by straining its turns while in position. This will, respectively, increase or decrease the pressure by a limited amount. The Lindall type of brush-holder, shown in Fig. 4, also comes under this class. This uses a Z-shaped flat bronze spring.

A square spindle-type brush-holder is shown in Fig. 5. In this a flat bronze spiral spring is anchored at one end on a square spindle forced into the brush-holder casting. The other end is hooked over an arm on the brush-holder harness or finger. To change this adjustment the spring with the harness is slipped off the square spindle and turned a quarter of a revolution and then replaced on the spindle. This arrangement gives four adjusting points in a revolution. A similar type, but having a hexagonal spindle, is shown in Fig. 6. The method of adjustment is similar but there are six adjusting points in a revolution.

A worm wheel type in which the adjustment means

consists essentially of a flat bronze spiral spring anchored on a sleeve on which is cut a spiral thread to engage a worm cut on the adjusting rod, is shown in Fig. 7. This adjustment is made by turning the adjusting rod with a screwdriver, giving an infinite number of steps for the spring tension. A ratchet wheel type with six teeth is shown in Fig. 8. This has a flat bronze spiral spring, one end being secured on a six-toothed ratchet wheel. The ratchet and spring are assembled in a metal harness or finger on which is fastened a pawl or dog which engages the teeth of the ratchet. The other end of the spring is held in an anchor clip riveted to the brush-holder Adjustments are made by shifting the ratchet from one tooth to another. This arrangement gives six adjusting points in a revolution. Fig. 9 shows a somewhat similar scheme of adjustment except that steel spiral springs are used and both springs are anchored to a brass sleeve which has a single set of six teeth on the ratchet located at its center. This makes a common adjustment for both springs and gives six adjusting points in a revolution.

A ratchet wheel type adjustment with ten teeth is shown in Fig. 10.

This uses a somewhat similar scheme of adjusting as that in Fig. 6 except that the design of the spring is different. It is a round steel wire helix and the method of anchoring is also different. This arrangement gives ten adjusting points in a revolution. A ratchet wheel type with fifteen teeth is shown in Fig. 11. This is similar to the six-tooth ratchet wheel type and is adjusted the same way except that to compensate for the use of a flat steel spiral spring with fewer turns, a fifteen-tooth ratchet wheel is used. There are fifteen adjusting points in a revolution.

A type of brush-holder with a flat bronze spiral spring anchored on a sleeve or barrel is shown in Fig. 12. This has ten adjusting notches equally spaced in the same plane around its circumference. These notches are engaged by points of set screws, located in the brush-holder casting. Ten adjustments in a revolution are made by turning the spindle from one notch to the other. A

spindle and cotter pin type of brush-holder, shown in Fig. 13, has a flat steel spiral spring which is anchored in a slot on the spindle. The spindle has four adjusting holes spaced 90 deg. apart in the same plane around its circumference. A boss on the casting has three holes spaced 60 deg. apart through which a cotter pin engages the holes in the spindle. This arrangement gives twelve adjusting points in a revolution by shifting the cotter pin and at the same time engaging a different hole in the spindle. Fig. 14 shows a similar arrangement with two sets of adjusting holes in the spindle, staggered 45 deg., and two sets of holes in the brush-holder casting. This combination gives 24 adjusting points in a revolution by shifting the cotter pin.

Barrel and cotter-pin types of brush-holders are shown in Figs. 15 and 16. In these a flat steel spiral spring is anchored in a slot on the barrel which has ten adjusting holes equally spaced in the same plane around its circumference. This barrel is anchored to the spindle by means of a cotter pin. The spindle is kept from turning by means of the cotter pin anchoring it to the brush-holder casting. This arrangement gives ten adjusting points in a revolution.

A pneumatic type of brush-holder is being developed in which there are no springs, the pressure being supplied by compressed air. An air-operated plunger resting on top of the carbon replaces the ordinary spring. An infinite number of variations of pressure on the brushholder are possible, being regulated by the air pressure.

BRUSHES SHOULD FIT SNUGLY

It is generally conceded that to prevent breakage of their side walls, carbon brushes should fit the box as snugly as possible without binding. To check this, information was obtained as to methods in use for determining wear inside the brush-holder boxes and for making repairs to worn surfaces. It is universal practice to check the wear on the insides of the carbon boxes. Information was received from 25 railways regarding this, 24 stating that they do check the wear and one stating it does not. Regarding the amount of wear permitted before brushholders are removed, seven reported a maximum wear of $\frac{1}{32}$ in., seven others allowed $\frac{1}{16}$ in. wear before replacement and two allowed $\frac{1}{8}$ in. wear. Of the others the minimum amount allowed was 0.01 in. and the maximum \(\frac{1}{4}\) in. Manufacturers recommend that the maximum wear should not exceed $\frac{1}{32}$ in. In regard to repairs made to worn carbon boxes, fourteen railways make repairs and eleven stated that no repairs are made. Of those that made repairs, six used the method of closing the carbon box onto a steel sizer; six others fill in worn portions by welding and then broach or remachine. Two additional companies have a practice of putting on a new



Fig. 13—A spindle and cotter-pin type of brush-holder is used on the Westinghouse No. 306 motor

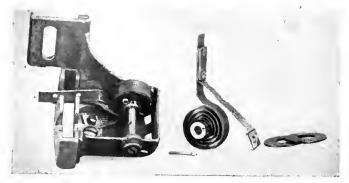


Fig. 14—Spindle and duo-cotter-pin type adjusting mechanisms used with Westinghouse No. 508 railway motor brush-holder

front, and the method used on one railway is to saw the box apart and then weld it together to the original dimensions.

In connection with the fitting of the carbons in the brush-holders, some information was obtained as to carbon-brush practice. Undercutting of the mica on railway motor commutators is now universal. This has permitted the use of a higher grade of carbon which has less grinding action. The recommended practice is for the use of a graphitized carbon brush. Generally a spring pressure of about 5 lb. per square inch of contact area is considered good practice. This gives a range of pressure on the carbons of from 5 to 7 lb., depending on their size. Information obtained showed a variation in spring pressure on carbons of from $2\frac{1}{2}$ lb. to 10 lb., the average, however, being 5 lb. per square inch. Where track is poor, resulting vibration necessitates increased spring tension in order to reduce sparking and the tendency for the motor to flash at high speeds. On some railways, marked improvement was obtained through raising the brush pressure to 7 and 9 lb. Under these conditions of increased pressure it was expected that the end wear of carbons would be quite rapid, but this was less with the high pressure than with the low under similar conditions of rough track. This was explained by the fact that with the increased pressure there is less burning at the commutator surface, and apparently the burning action wears away the brush more rapidly than mechanical friction from the increased pressure.

From the information obtained it was found that from 0 to 95 per cent of the brushes were replaced for side wear, the majority stating that on the average about 25 per cent are replaced for this reason. An attempt was also made to determine if the length of brush used had any effect upon the resulting side wear, the thought being that long brushes cause a greater side pressure due to the action of the contact tip. The greatest number of replies indicated a length of brush of from 2 in. to 3 in. The shortest length which a brush was reported as being worn before replacement was necessary was $\frac{1}{2}$ in. and the longest $2\frac{1}{4}$ in.

Causes of side wear appear to be in most cases dust and dirt and worn carbon boxes. Some other causes mentioned were irregularities in carbon box face, rough commutators, vibration, broken shunts, weak tension, lost motion in bearings, spring contact out of line with brush, worn pins in brush-holders and one-way operation of cars. The proportion of brushes which it is necessary to replace for breakage is negligible, according to the majority of the replies. In one reply, however, this was given as 20 per cent. In regard to the fit of the brushes when both brush-holders and carbons are new, ten railways reported that they specify a brush $\frac{1}{64}$ in. smaller

than the box. Manufacturers recommend that the initial side clearance in the carbon box be from 0.006 to 0.008 in. If it is much less, the carbon will tend to stick in the box, and if greater it will rattle in the box and wear away the sides. There is also a tendency to chip and break with large clearance. The width variation of brushes is not so important. In some cases, brushes were reported with as much as $\frac{1}{16}$ in smaller width than the box without causing any trouble in service.

Eighteen railways gave the life obtained from carbon brushes. The average maximum brush life for these eighteen railways was 40,905 miles and the average minimum was 16,748 miles. It thus appears that 20,000 miles

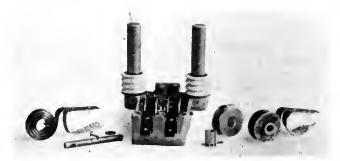


Fig. 15—Barrel and cotter-pin type adjusting mechanism for Westinghouse No. 319-B railway motor brush-holder

is a good average to be expected. Shortly after the ventilated railway motor was introduced, investigation of this point showed that most railways have experienced greater wear with the ventilated motor. Further investigation and studies made from the data available shows that this increased side wear in ventilated motors is due largely to the abrasive action of the dust and dirt drawn through the motor by the ventilating fan on the armature. On thirteen properties included in the present survey both ventilated and non-ventilated types of motors were used, so that a comparison of the performance in the same service was obtained.

The information on brush mileage included replies from fifteen properties that have both interpole and non-interpole motors in use. Some of the means suggested for reducing side wear of carbons in ventilated motors are given. It is advisable to select carbons carefully in order to secure brushes best suited to operating conditions. Some operators have done this by making tests of the various grades. Shunts to the carbons in some cases have seemed advantageous. Instances have been given where the use of one wide carbon instead of two narrow ones in the same brush-holder has reduced side wear. There is some disadvantage to this, as two separate carbons are less likely to cause flashing at the commutator.

RELATIVE WEAR OF BRUSH-HOLDER PARTS

An effort was made to accumulate data on the average life of various brush-holder parts such as castings, springs, shunts and spindles. Very complete information from twelve different railways showed an average life of 8.3 years for brush-holder castings, 4.4 years for springs, 3.5 years for shunts, and 4.2 years for spindles.

Shunts on carbon brushes have almost entirely disappeared. Of the entire 25 railways included but three still used them. Shunts on brushes have been replaced by a shunt on the brush-holder, which connects the contact tip on the finger with the main casting. This shunt must be large enough to carry the current and make a good electrical contact. It may be brazed, soldered or

riveted. A good electrical path for the current prevents much of the side wear of the carbon and the burning of the carbon box. Therefore, it is very important to keep the shunts in good condition.

Only two railways out of 25 reported extensive breakage of shunts; the others have practically no trouble. Pressure springs are a larger source of trouble, seventeen of the 25 railways having some trouble from pressure springs losing their tension. Increased life and less loss of spring tension have resulted from use of a good quality of material, through checking tension at frequent intervals, and on some properties by changing from a bronze to a steel spring. Other practices that have increased the life of pressure springs are keeping commutators true, eliminating excessive wear in bearings, loosening spindles when they are too tight, and changing from the spiral spring type to the clock spring type.

In most types of railway motors the brush-holders should line up with the center line of the poles, and the distance from the center line of one brush-holder to the center line of the other should always be equal to one-quarter of the distance around the face of the commutator. The most common practice for checking alignment of brush-holders was that of lining the carbon box up with the commutator bars, thirteen railways using this method. Four others check alignment with jigs, and four check from the machined supporting surfaces. The ordinary method of checking spacing is by counting the commutator bars. Some railways use a special gage for their motors, and one railway uses a steel scale.

It is common practice to keep the underside of the carbon box from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. above the commutator surface so as to prevent breakage of carbons. This is done by loosening the clamping block and moving the brush-holder until the correct setting is obtained. A piece of fiber $\frac{1}{8}$ to $\frac{1}{4}$ in. thick makes a handy gage. The nut which holds the clamping block should be tightened



Fig. 16—Ten adjusting points are provided in this G.E. No. 80 barrel and cotter-pin type brush-holder

carefully so that the brush-holder will not come loose. From the information obtained, it appears that an average of $\frac{3}{16}$ in, is most used, although some railways specify $\frac{1}{8}$ in. Carbon dust and dirt are usually cleaned from brush-holders and insulators by wiping and by compressed air. Four railways use gasoline for cleaning and one uses a wire brush.

Out of 25 replies giving the extent to which brush-holders with replaceable carbon brush boxes are used, eighteen had some type of renewable box in service. In regard to advantages, the most general reply was that they were installed as a means toward economy, and that they are proving very satisfactory. Nine replies stated that the new type brush-holders had not been in service a sufficient time to determine advantages or disadvantages.

Machines Scrub

as Well as

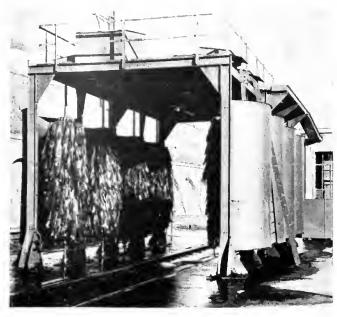
Wash Cars

Novel devices differing somewhat from those developed in America have been perfected by European railways

SEVERAL European car-washing machines have been described in this paper within the last few months. All have been based on the principle of directing sprays of water against the sides and ends of the car. This is the principle generally followed in car-washing machines used in the United States. Where this method is followed, it often is necessary to apply a scrubbing brush against the side of the car as well, so as to remove any spots of hard mud that resist the washing action of the spray.

With car-washing machines now in use on the Paris-Lyons-Mediterranean Railway, the Metropolitan Rapid Transit Railway of Paris, and the London Underground Electric Railway, manual scrubbing is not necessary except at the ends, as it is done by machine. The scrubbing is accomplished by long strip "wipers" attached to vertical revolving shafts driven by motors. As the shafts revolve, the strips, which are heavy with water, are thrown out horizontally by centrifugal force against the sides of the car. The car passes through four pairs of these wipers at the same time that it is sprayed from vertical pipes with perforations set at different angles so that the sides of the car are thoroughly washed down.

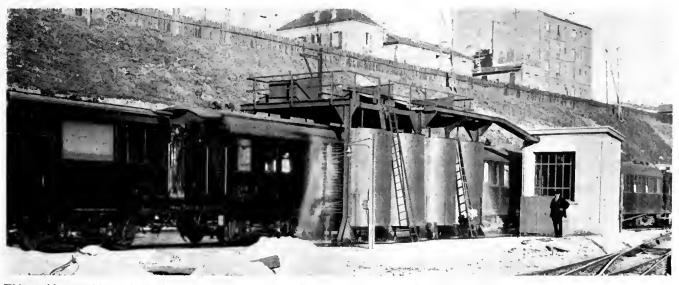
The accompanying illustrations show the washing equipment of the Paris-Lyons-Mediterranean Railway.



This view of the French washing machine shows the vertical shafts and wipers. Employees can reach the elevated platform above the machine for the repair of the machinery by means of an iron ladder

There are four revolving shafts on each side of the track, each pair being driven by a 15-hp. motor. These shafts are driven at different rates of speed and in different directions. The first pair revolve at 49 r.p.m. and the ends of the wipers rub against the car in the direction opposite to that in which it moves through the machine. The second pair is driven at 46 r.p.m., the ends of the wipers touching the car moving in the direction in which the car is moved. The third pair moves in the same direction as the second pair, but at 59 r.p.m., and the fourth pair in the same direction as the first pair, but at 37 r.p.m. Water is sprayed both on the wipers and on the car body. The car passes through the washing machine at a rate of about $1\frac{3}{4}$ m.p.h.

Various types of material have been used for the wipers. Until very recently these wipers have been cut from the same cloth as used for the upholstery in the company's first-class and second-class compartments. This is a very high grade of textile upholstery goods, somewhat like mohair, and able to stand up well under



This washing machine is located at Bercy-Conflane just outside of Paris. It scrubs as well as washes the cars, which pass through at the rate of 134 m.p.h. Sometimes as many as 500 cars are washed each day by this machine, working 24 hours per day

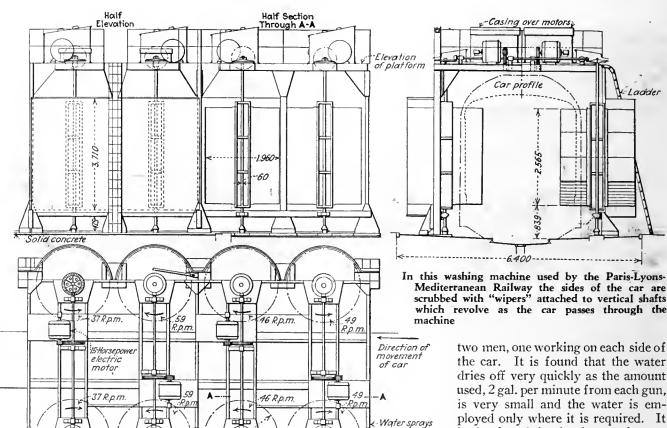
the hard service to which it is put. When this material is used the wipers have to be replaced only about once a month.

Unfortunately for the department responsible for the washing of cars, the company has given up the use of this material in its upholstery, so no more of it is available. Instead the maintenance department is testing some other kinds of cloth for this service. Some are proving more satisfactory than others but none has as yet given as good results as the mohair previously mentioned.

The washing machine of the London Underground Railways is installed at its Ealing Common depot and is very similar in construction. According to the London Engineer, the wipers on the four pairs of vertical shafts are soft leather, but other recent British periodicals speak of them as being of soft cloth. After-leaving the reof the gun with great force. It is conveyed from the main high-pressure supply to the guns by specially strengthened rubber hose which leads down from a roof pipe in the carhouse. The guns can be arranged to give either a fine spray or a powerful jet. The latter is used to clean dirt from the running gear under the car and the former for cleaning the windows and panels.

Besides the removal of dirt by the force of the water, some scrubbing of the sides and windows is done by hand at the same time that they are sprayed. A light brush, fitted on the end of an aluminum rod, 5 ft. long and attached to the spray gun, is used for this purpose. As this brush is so arranged that the jet sprays just below the brush, the two operations of spraying and scrubbing are reduced to one operation.

A double-deck car is washed in about two minutes by



volving scrubbers and before emerging from the machine, the car passes through a further spray to complete the

Each car goes through this machine every four to six days, in addition to the nightly cleaning that every underground car receives. The routine of the London cleaning machine may be summarized as follows: (1) The cars are passed through the machine every four to six days for the purpose of a wash down and for window cleaning. (2) The cars are periodically scoured to remove all dirt that may gradually adhere to the paintwork after which they are again passed through the machine.

The British technical papers also report that the Metropolitan Tramways Company of London has installed some so-called water spray guns for cleaning its cars. These guns are directed by hand and receive their supply of water from electric pumps which give a pressure of 300 lb. to the square inch. Hence, the water comes out

two men, one working on each side of the car. It is found that the water dries off very quickly as the amount used, 2 gal. per minute from each gun, is very small and the water is employed only where it is required. It is also found that by the use of water under high pressure, parts of the running gear can be cleaned which could not be reached by ordinary methods.

The JOURNAL is indebted to the Department of Commerce, Washington, for particulars of the French machine described, with samples of the wipers used.

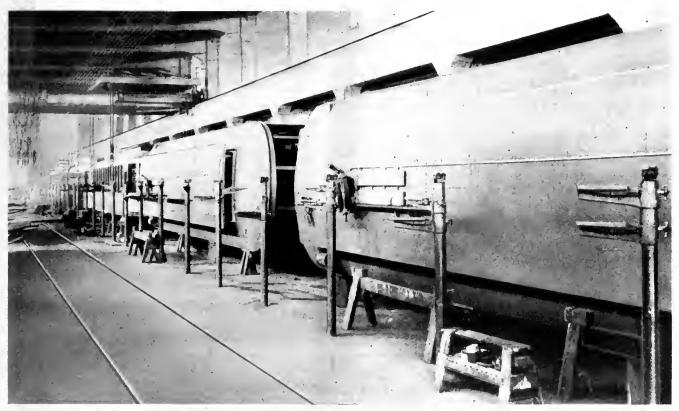
New Records for Chicago Elevated

NLY three or four years ago it was considered exceptional operation when as many as 900 cars entered the Loop over the lines of the Chicago Rapid Transit Company in an hour. Through the use of extended station platforms and longer trains, together with a rearrangement of train stopping points at Loop stations, operation has been speeded up until 1,000 cars an hour is now the daily average entering the Loop in the morning rush. A high record was set on the morning of May 27, when a total of 188 trains of 1,032 carsentered the Loop in the hour between 7:50 and 8:50 a.m.

Turning Cars on Their Sides

Facilitates General Repairs

By means of cradles and specially fitted cranes entire car bodies are turned over readily in the Twin City shop. Work on the under side is made much easier



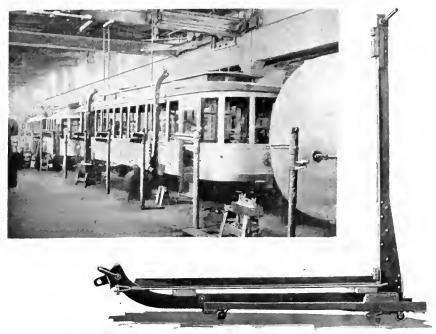
A row of cars in the Twin City shop. The two in the foreground are undergoing repair while they are turned over, while those in the rear have been turned back to the upright position for completion of the overhauling

AR repair work has been facilitated in the St. Paul, Minn., shop of the Twin City Rapid Transit Company through the adoption of a plan of turning car bodies edgewise for general overhauling. The plan, which was devised by W. J. Smith, master mechanic, has made possible more effective inspection to detect rotted and corroded parts and has made the substitution of new parts comparatively easier.

When a car arrives at the shop for general overhauling it is first placed on an outdoor receiving track for stripping. Here the readily removable parts, such as doors and window sash, seat cushions and miscellaneous fittings are taken out and sent to the proper departments for inspection and repair. Either the trucks are removed and temporary trucks are substituted or the truck connections are loosened so that the permanent trucks can be removed readily. The car is then run on the transfer table and sent into the main repair bay, being spotted on one of the two tracks set aside for the purpose of general overhaul.

Two cradles are then placed around the car body. An accompanying illustration shows one of these cradles. In the picture it is resting on a wooden truck which has been designed for holding it so that it can be moved about the shop readily when it is not in position for holding a car in the process of turning. It will be seen that the cradle has two main members at right angles. These are steel forgings shaped roughly to fit the contour of the car. They are permanently joined together at right angles, so that when the bottom member is beneath the body sills the upright member will rest along the side of the car. A removable member serves as a diagonal brace, passing through the windows and connecting with the upright member at a point near the top of the window opening. On the opposite side it is fastened to the end of the horizontal member. A fourth member of the cradle, which is a round steel rod, is placed on the opposite side from the permanent frame. This rod is free to rotate as the car is turned.

When the cradles are placed in position about the body



Two of these cradles support the car while it is in process of turning.

The insert shows a car which is swinging on the cranes

they are held firmly in place with blocks so that there is no chance of the body shifting as it is turned. With the cradle in place, hooks from the carriages of the overhead traveling crane are attached to the cradle, one set at the bottom next to the sills and the other set at the top of the side frame adjacent to the roof and to the round rod. The body is lifted clear of the trucks, which are run out so that the body is free to move. The differential gear on the crane is then brought into play. This gear consists of a pair of drums with one set of cables reversed so that as one lifts the other lowers an equal amount. The body, swinging free, is then literally rolled over on its side by means of the differential gear. When it has been turned through an angle of 90 deg, horses are placed underneath and the body is lowered onto them. The cradles are then removed and the body is ready for inspection and repair work.

The process of righting the cars is similar to that described for turning them over, the motions merely being reversed. One of the illustrations shows a car which has just been righted and which still is swinging on the crane. The workmen are preparing to put blocking underneath the sills so that the body may be lowered from the crane and the cradle removed.

One of the views shows a row of cars in one of the bays. Those in the foreground have been turned over and work is being done on them. The ones in the rear have already been through the processes that are carried out on the side and have been righted once more, after which the work of reinstalling the parts which were removed takes place.

ADVANTAGES OF TURNING CARS OVER

A number of advantages result from the use of the new process. The principal one is that it is possible for the workmen to get at parts of the car which ordinarily are inaccessible, such as the underframing and the equipment beneath the floor. Inspection of the framing is an easy matter when the car is turned over, and many defects have been discovered which never would be noticed if the inspector had to get into a pit and look upward,

depending on a portable lamp for light. Rotted timbers and rusted hangers, air tanks and other metal parts have been discovered. Naturally it is easier to attach or remove equipment which is fastened beneath the car, and wiring can be done with comparative ease.

Another advantage which is seen is that it is possible to paint the under side of the car, getting a good penetration of a protective paint, which was not possible with the old methods. It is felt that this protective painting will result in a much longer life of the framing, the floor and the equipment mounted under the car.

While one gang is working on the equipment beneath the car, another force is able to work inside. This is made possible by laying planks along the side, which now is in the lowest position. Painters can clean and varnish the headlining so as to obtain a better finish in less time and with less fatigue than when the work is done overhead. At the same time attention

is given to the roof. While this can be done in the ordinary repair process, it is felt that the workmen are able to do a better job while standing erect and facing the roof than when they must crawl over it, having a relatively insecure footing and being forced to work out toward the edge. This is particularly true with the monitor roof cars used in the Twin Cities.

Mr. Smith estimates that the new method has made a material saving in the cost of doing the work, in addition to the better class of workmanship that is attained.

Concrete Beam Track Construction Used in Atlanta

I MPROVED practices of track and roadway construction and maintenance have resulted in lower cost and increased reliability of service for the Georgia Power Company, Atlanta, Ga., as described in the brief of that company submitted in the competition for the 1927 Charles A. Coffin Award. There was a reduction in total derailments and split switches from 270 in 1923 to 129 in 1926.

An original type of concrete beam track has been developed. Benefits of using creosoted ties and timbers have been demonstrated and a system for the handling of sand has been inaugurated in which air pressure is substituted for manual labor.

With the concrete beam track a saving of 40 per cent of the concrete and 43 per cent of the rail cost has resulted. The ties and the base of the rails are supported by concrete. The saving in the rail cost is because with the continuous support a light 80-lb. A.S.C.E. section can be used.

After excavating to the subgrade of the paving, the ground is tamped thoroughly or rolled if necessary. After excavation for the beams, the rails and ties are laid. The rails are then bolted together temporarily and spiked with the company's combination tie plates on every tie. The joints are next thermit welded, the track is brought to grade on creosoted pine blocks and the exact







Four stages of concrete beam track construction

- 1. Trench excavated and rolled.
 - 2. Earth mounds excavated.
- 3. Ties and rails ready for pouring concrete.
 - 4. Finished construction,



final line and surface are adjusted by the use of oak wedges. Immediately following this the concrete structure and the paving are poured if concrete is to be used. The concrete is tamped thoroughly beneath the ties and rails. This method leaves the concrete in beams around the rails and ties, with mounds of earth in between.

This type of construction costs 15 per cent less than 7-in., 122-lb. rail on stone ballast, 29 per cent less than 7-in., 122-lb. rail on concrete beams of similar construction and 20 per cent less than 80-lb. A.S.C.E. rail on ties spaced 2 ft. apart and concrete laid without mounds between the ties.

CONCRETE FOUNDATIONS COMPLETED IN 24 HOURS

A process of laying concrete track and paving foundation under traffic has been developed by use of which jobs can be completed in 24 hours or less. The process consists of double tamping clean crushed stone 5 in. beneath the ties, after which new crushed stone is added to bring the foundation to the required height for the paving base. This is rammed thoroughly. The stone is then filled to its surface with 1 to $1\frac{1}{2}$ grout to which 3 lb. of calcium chloride per sack of cement is added. The paving surface is laid immediately and traffic turned on it as soon as it is ready.

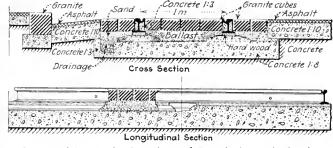
Improved use of electric welding in track construction has resulted in lower cost and increased efficiency. Worn flangeways in crossings have been filled in successfully with electric welding and ground to correct depth to make them flange bearing. The building up of the heels of switch tongues with electric welding is being done with excellent results. This treatment has been found superior to the common practice of using thin shims at the heels of switches. These and other uses of electric welding will prolong the life of the frogs, crossings and switches, with resultant saving in maintenance cost. Electric seam welding of joints is also done successfully.

Jugoslavia and American Track Differ in Many Respects

By Milan Manojlovitch

Chief Consulting Engineer Subotica Electric Railway & Light Company, Subotica, Jugoslavia

WIDELY divergent methods are used in the construction of track systems in America and Central Europe. In America street car rails are laid directly in concrete on some properties, utilizing ordinary T-rails. In Jugoslavia and Central Europe, in general, the use of concrete and asphalt in direct connection with rails is avoided as much as possible. It is the practice to place paving blocks of stone, ceramic material or wood in two or three rows on either side of the rail. By this



Cross and longitudinal sections of Jugoslavia track showing parallel under-construction and use of gravel ballast

method the breaking and crushing of concrete and asphalt which result from the elastic movement and the continual vibration of the rails under traffic conditions are avoided. This method is also employed wherever the rails themselves are placed on solid concrete foundations. It is only with this method that we have been able to prevent the deterioration of the concrete and asphalt. How-



The two rails are held firmly by pneumatic clamps while being welded

ever, concrete streets without asphalt overcovering are not usual here, nor is the T-rail, track construction laid in concrete found on the main streets of our cities.

Our rails are laid on foundations immediately under and running parallel to the rail itself, whereas in America cross-ties are used. We use cross-ties only with track construction on stone ballast without concrete, on open stretches outside of the city limits. The rails are joined at frequent intervals by spacing bars, which serve also as the electric connection, but these do not replace the cross-ties above mentioned.

In paved city streets grooved rails with the border of paving blocks as above mentioned are used.

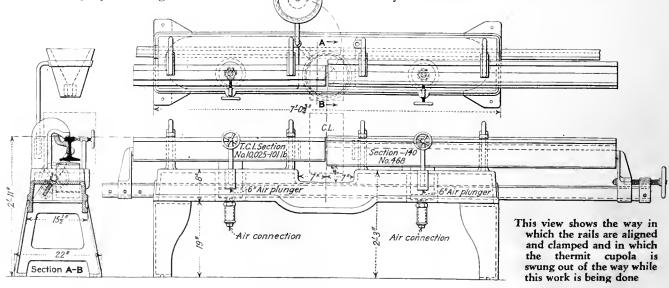
Clamps for Thermit Welding Compromise Rail Joints

CONSIDERABLE interest has been taken in the device for holding short sections of rail while they are being welded together to form a compromise joint, developed and built by the Birmingham Electric Company, Birmingham, Ala. A

short account of it was published in the issue of this paper for June 18, 1927. The design of this device was brought about because of the large number of compromise joints required following the adoption of the A.E.R.E.A. 7-in. girder rail for replacing special work as it is renewed. As it was not found practicable to make the necessary compromise joints under traffic and as the work of lining them up and clamping them in position for welding them by hand took a long time, the machine was built.

Two illustrations of the machine, one of them a working drawing, are published herewith. The bedplate, which has four legs, has at the top four upright arms whose lower surfaces are planed accurately so as to align the tops of the two rails to be welded. On the opposite side from these arms are two screw clamps which, with two 6-in. air plungers below, hold the two rails firmly while they are being welded. Before these clamps are finely set up, the rail ends are forced together by a longitudinal screw clamp.

The thermit cupola is held in a hinged frame so that it can be swung aside while the rails are being aligned. It is then swung back so that it will discharge directly into the joint weld mold.



Cincinnati Adopts Supervisory Control for Power System

By Harley L. Swift
Superintendent of Substations Cincinnati Street Railway,
Cincinnati, Ohio

COMPLETE revamping of its power distribution system has been decided on by the Cincinnati Street Railway. Under a plan which recently has been embarked on the street railway's power plant will be sold to the Union Gas & Electric Company of Cincinnati. Power for the railway will be purchased from this company and distributed through nineteen full automatic substations, all of which may be controlled by a centrally located load dispatcher or supervisor.

About half the power now comes from the railway's Pendleton generating plant at three-phase, 25 cycles, while the remainder is purchased from the power company at three-phase, 60 cycles. The Pendleton plant supplies five manual substations, while the power company

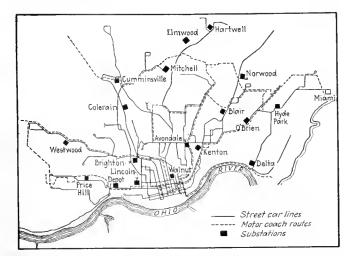


Architect's drawing of the completed Colerain substation

supplies three full automatic stations, three manual stations and a converter in one of the 25-cycle railway substations.

The new plan calls for the abandonment of one substation, the remodeling of nine substations and the building of ten new ones. The average distance between the stations will be about 1 mile. The most remote station will be about $8\frac{1}{2}$ miles from the load dispatcher's office, which will be adjacent to the Walnut Street substation, almost in the heart of the business district of Cincinnati.

The interior arrangement of all new buildings, and in so far as is physically possible of all the old buildings, will be exactly alike. All the equipment will be located on one floor and in one room. There will be no win-



The new Cincinnati railway power plan calls for full automatic supervisory controlled substations

dows, but there will be two doors, one of which will be for emergency use only. To prevent further the transmission of noise the converter will be mounted on 2 in. of either Armstrong or Korfund machinery isolation cork and the ventilators will be made of Robertson's protected metal.

Both single-unit and two-unit stations will be built and ample provision will be made for future additional power requirements. The double-unit stations will be 38 ft. x 75 ft. and will contain two 1,500-kva. converters. The single-unit stations will be 38 ft. x 40 ft. and will contain either one 1,500-kva. or one 1,000-kva. converter. The transformers and high-tension bus structure will be inside the buildings.

Exteriors have been planned to fit the neighborhoods in which the stations are to be located. Several of the stations are to be in high-class residential districts where the City Plan calls for a set type of construction. Beautified structures have been planned for such instances, while all the buildings will be a credit to their localities.

Four buildings are now practically completed, and contracts for five additional buildings are being let. It is expected that the entire program will be completed and in service by June 15, 1928.

The General Electric Company has the contract for furnishing all electrical equipment and for remodeling the present alternating-current controlled automatic stations to function under the General Electric direct-current scheme called for under the contract.

A later article will describe in detail the equipment, buildings, and operating plans.



The Lincoln Park substation as it appeared on Dec. 2. This indicates the character of the territory



The Westwood substation on Dec. 2. The general appearance may be seen from the illustration

Monthly Prize for December in Maintenance Contest

Won by D. S. MacKay

Machine for changing tires of buses as developed by the Boston Elevated Railway awarded the \$25 Monthly Prize for December in "Electric Railway Journal's" Maintenance Competition. Efficient system for dipping and draining field coils used by the Georgia Power Company received Honorable Mention.



HANGING tires on buses is an every-day job and considerable equipment has been devised for simplifying the work. Most commercial equipment, however, is designed particularly for automobile garages and is not considered satisfactory for the heavy duty service of removing bus tires. A tire-changing machine designed particularly for bus maintenance as developed by the Boston Elevated Railway and as submitted in the maintenance contest by D. S. Mac-Kay, supervisor of automotive equipment for the company, has a much stronger construction than the usual type of machine. It has the appearance of a very practical piece of equipment designed to give satisfaction in heavy duty service. Provision is made for tilting so that there is no necessity for lifting the wheel to its place, making it a decided labor saver. That five tires can be changed in the time formerly required for one commends the device for use. machine provides a large bearing surface on the tires, and being designed particularly for bus service is strong and hardy in every way. It gives a simple and quick method for changing bus tires.

A description of the machine and its use were published in the Dec. 17 issue of Electric Railway Journal. It was submitted

in the contest by D. S. MacKay, supervisor of automotive equipment for the Boston Elevated Railway, Boston, Mass.

A dipping and draining system for field coils as submitted by the equipment department of the Georgia Power Company, Atlanta, Ga., was awarded honorable mention by the contest judges. The equipment is arranged to take little space in the shop and provides an especially efficient method of dipping and draining. Besides conserving space, the equipment used given a neatness and cleanliness to the rather mussy operation of dipping and draining field coils. The labor involved is minimized through the use of this equipment and a maximum of the drippings are salvaged.

Competition for the December prize was very close. The items selected for the monthly prize and for honorable meution were two of the group published in the December 17 issue. An additional group, which will be judged for the \$25 monthly prize for January, is included in this issue. One of these will receive the award and another one honorable mention. Results of the contest each month are published in the issue of the JOURNAL devoted to maintenance and construction, which is the third issue.

The following gives a summary of conditions for submitting material in the contest.

Any employee of an electric railway or bus subsidiary may compete.
 The author does not need to be the

2. The author does not need to be to originator of the idea.

3. Articles may be submitted by several persons or by a department.4. Any maintenance practice or device for electric railway or bus repairs may

be the subject.
5. Articles should be 100 to 200 words long with one illustration, and in no event longer than 400 words with two illustrations.

6. Illustration material may be in the form of drawings, sketches, blueprints or photographs. All sheets should be marked "Maintenance Competition."



D. S. MacKay

who won the December prize in Electric Railway Journal's Maintenance Contest, is supervisor of automotive equipment for the Boston Elevated Railway. He has been in the employ of this railway and its predecessors since August, 1895. When he first became connected with the company, it was operated under the name of the West End Street Railway. During his long period of service he has served as wireman, repair man, motorman, inspector of buildings and car tracks, yard master, foreman in various car houses of the company, and in his present position as supervisor of automotive equipment. He was appointed to this latter position in 1924.

The Boston Elevated Railway at the present time maintains seven garages, four exclusively for buses. In these are stored a total of 416 pieces of various types of automotive equipment, which includes 242 buses. Mr. MacKay has evidenced a particular desire to utilize the latest improvements in equipment for expediting the handling of maintenance and repair work, and the many improvements to equipment which he has worked out, show the thoroughness with which he is considering the maintenance side of bus operation.

7. Manuscripts should be mailed to the editor of Electric Railway Journal, Tenth Avenue at 36th Street, New York.

8. A prize of \$25 will be awarded each month for the best maintenance idea in the group published. A minimum of \$5 will be paid for each article accepted for publication. Manuscripts will be received until April 30, 1928.

9. Announcement of the winner each month will be made in the issue devoted to maintenance and construction (the third issue each month) following the consequence of the item.

one containing the item.

10. Additional details were given in ELECTRIC RAILWAY JOURNAL for April 16, pages 700-701.

Electric Railway Journal Maintenance Data Sheet
ROLLING STOCK—ELECTRICAL—34

Press Saves Time in Bearing Removal*

By J. A. DUFFY
Superintendent of Equipment Monongahela West Penn Public Service Company,
Fairmont, W. Va.

WE USE a home-made press in our shops for very many forcing operations, the principal one of which is pressing out bearings. With this the source of power is a 12-in. x 14-in. brake cylinder which is attached to one end of a rocker arm, while the other end supports the plunger used in the forcing operation. The base for the press is made of two 10-in. I-beams. The brake cylinder is pivoted to this in order to avoid the use of a slotted or oblong hole in the power arm, as we have found the pivoted construction better. The plunger has a center bearing support, so as to insure accurate vertical movement. It is connected to the power arm through a toggle joint. Air pressure is controlled by an ordinary straight air brake valve.

Brake cylinder 12" x 14"

1"x 5" Fulcrum pl.

1"x 5" Fulcrum pl.

2'6"

A 18"

Section A-A

Section A-A

Air press used for various pressing operations in shops of Monongahela West Penn Public Service Company

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet
ROLLING STOCK—ELECTRICAL—36

Efficient Commutator Slotting Device*

BY H. A. ALBIN

Superintendent Lancaster, Ephrata & Lebanou Street Railway, Lebanou, Pa.

COMMUTATOR slotting is done by an inexpensive and efficient undercutting device constructed and used in the shops of the Lancaster, Ephrata & Lebanon Street Railway. It can be used to slot the commutator of any armature which can be swung in a lathe.

A shaft with a commutator saw on one end and a pulley on the other is supported by two bearings attached to an upright of a piece of steel strap, bent to U shape. The other upright side of the iron is clamped to the binding post of the lathe in



Commutator slotting device used in the shops of the Lancaster, Ephrata & Lebanon Railway

which the armature is swung. With this arrangement it is unnecessary to have a guide to keep the saw from damaging the commutator segments, as when the lathe is centered the running of the carriage back and forth provides the desired accurate alignment.

The shaft on which the saw is mounted is driven by a small electric motor which is fastened to a U-shaped bracket, which in turn rests on the carriage of the lathe. The motor is belted to the pulley on the shaft.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—35

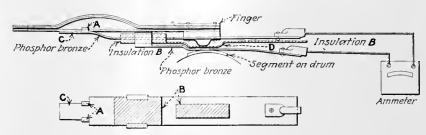
Double Contact Current Measuring Device*

BY ARTHUR E. CLEGG

Foreman Electrical Department, San Diego Electric Railway, San Diego, Cal.

AUSES of trouble in electrical circuits on cars of the San Diego Electric Railway are located by a double contact current measuring device which the electrical department uses to obtain an ammeter reading. This device can be put in the circuit of a drum switch very quickly in the following manner:

The finger of the switch should be raised just high enough to pass the end of the current measuring device under it so that the contact tip of the finger will rest in the slot designated on the accompanying illustration as B. The clips A are then fastened to the finger spring and the spring effect of C bearing against the finger spring makes a good electrical contact. A heavytreated canvas is used for insula-



Double contact current measuring device

tion to separate the two contacts soldering. Leads of convenient C and D, which are made of phos-length and proper carrying capacity phor bronze. are soldered into the terminals.

The contact tip of the finger rest-These leads can be brought through ing in slot B bears down on the con-the car window and connected to an tact D as it comes in contact with ammeter when the double contact the segment of the drum. To pro-measuring device is inserted in vide leads to the ammeter at the endeither the reverser or motor cut-out of each contact a terminal is fas-switch circuit if these are of drum tened by means of a rivet and type.

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Shect

ROLLING STOCK—ELECTRICAL—37

Phosphor-Bronze Armature Bearings Profitable*

BY R. T. CHILES Master Mechanic Cumberland County Power & Light Company, Portland, Me.

NE of the most profitable mainbearing mileage:

Type Motor	Number of Motors in Active Service	Bearing Miles		
GE-67	114	52,189		
GE-80	138	80,705		
GE-201 203A,	G, GE- GE-247-B 140	173,965		

The composition of the metal used frame head with a wheel press. We tenance practices in use on our in the bearings is 80 per cent copper, have never had to take a car out of property is that of operating phos- 10 per cent tin, 9 per cent lead and service to remove an armature for phor-bronze armature bearings with- 1 per cent phosphorus. Bearings are bearing wear in our box frames out babbitt or tin lining. We have bored 0.015 in. larger than the type of motors. The equipment is been using these bearings for the armature shaft and all armature overhauled completely on an average past five years and have had wonder- shafts are inspected carefully for once every three years and during ful results. For the year 1926 the trueness. After the armature is in- this overhauling, if we find an following was the average armature stalled in the motor frame particula: armature bearing worn 0.041 in care is taken to see that it can be larger than the armature shaft sizerotated by hand.

frame head of box frame motors the loose in the frame head. Armature armature bearing is pushed into the shaft wear has never been unusual.

it is removed. Usually our removals In fitting armature bearings to the are for pinion end bearings being Electric Railway Journal Maintenance Data Sheet ROLLING STOCK—ELECTRICAL—38

Periodic Testing of Field Coils Reduces Trouble*

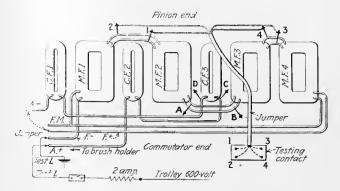
By FARRELL TIPTON

Electrician San Diego Electric Railway, San Diego, Cal.

It is the practice of the San Diego Electric Railway each time a motor is removed from a car to give the windings an electrical insulation test. Fields are tested by the drop potential method to give the insulation resistance between turns. To facilitate this work a test jumper shown in the accompanying illustration has been devised. With this one man can make the drop potential test in a minimum time.

The jumper is made of four No. 14 gage wires, 36 in. long. These are cabled together within 15 in. of the test pins. One end of each wire is fastened to a small sharpened steel pin by means of two nuts and a brass washer on which a symbol is stamped. The other ends of the wires are fastened to terminals on the testing board. These have symbols corresponding to those on the other ends at the test pins. Additional test pins are used to make millivoltmeter contact.

The test board is made of bakelite. It is 5 in. long, 3 in. wide and $\frac{1}{2}$ in, thick. Brass machine screws are used for terminals and testing contacts. In using this



Details of field coil testing device

test equipment the pins are inserted at given points and the drop across each coil is read separately by placing the test points of the millivoltmeter on terminals as listed in the accompanying table:

Field Coil Under Test	Points of Contact
Commutating field No. 1	. A- and D
Commutating field No. 2	A + and C
Commutating field No. 3	D and C
Long main field No. 1	. F- and 2
Short main field No. 1	F.M. and I
Long main field No. 2	. B and 2
Short main field No. 2	. A and I
Long main field No. 3	. B and 4
Snort main field No. 3	. A and 3
Long main field No. 4	. F.M. and 4
Short main field No. 4	. F+ and 3

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK-TRUCKS-18

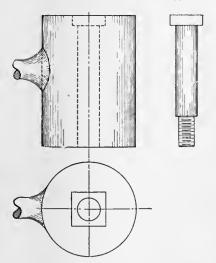
Die for Making Truck Swing-Link Bolts*

BY CHARLES HERMS

General Foreman San Diego Electric Railway, San Diego, Cal.

SWING-LINK bolts used for trucks by the San Diego Electric Railway are made in a die shown in the accompanying illustration. It is made of a piece of an old axle and is the exact length of a finished bolt. The hole of the die is bored about 0.005 in. larger than the desired shank of the bolt to allow for expansion while hot.

Cold-rolled steel stock is used and this is cut off just long enough to allow for a full head. A dozen or more of these pieces are thrown into the fire and heated to a white heat. They are then removed one at a time, and before inserting in the die each one is quenched in cold water so that



Die used to form swing-link bolts for trucks

just enough of the stock remains hot to form the head. The piece is then placed in the die and usually two light blows from a steam hammer finishes the head. By inverting the die the bolt slips out freely.

After the bolts are headed they are sent to the machine shop and the ends are turned down and threaded. Where cold-rolled steel is used it is not necessary to turn the shank. After threading, the bolts are drilled for cotter pins and are then sent back to the blacksmith shop for case hardening.

The total cost of material and labor, including overhead charges, amounts to 40 cents per bolt.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—39

Commutator Wire-Slot Cleaning Tools*

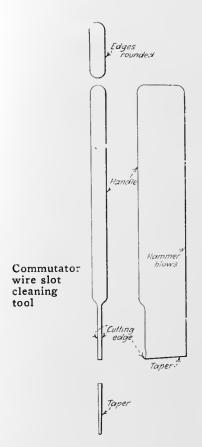
BY FRANK VOLENEC

Armature Winder Omaha & Council Bluffs Street Railway, Omaha, Neb.

solder remaining in the commutator slot to be cleaned. wire slots which must be removed shape. The tools are all similarly hammer.

THEN an armature is stripped shaped but of different thicknesses, there is always more or less old depending on the width of the wire

Shaped like a shaper tool and havbefore rewinding. This is usually ing three cutting edges, the tool in considered a tedious task by the re- one operation cleans the sides and pairmen. In the shops of the Omaha bottom of the slot. For clearance & Council Bluffs Street Railway a the tool is tapered away from each set of slot-cleaning tools has been cutting edge. The corners of the made for the different types of file teeth at the upper end of the tool armatures to do this work easily and are ground away to make a handle thoroughly. These tools were made for holding the tool while it is driven from old files ground to the proper through the slot by means of a



*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK-TRUCKS-19

Centering Truck for Testing Car Axles*

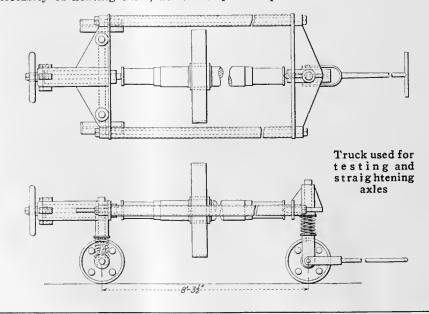
By A. TAURMAN

Superintendent of Equipment Way and Structures Birmingham Electric Company, Birmingham, Ala.

an axle centering truck which necessity of heating them, as it has present practice. has proved of particular convenience on our system. The truck was constructed in our shop to test axles after the wheels had been removed, to see that they were perfectly straight. Where the testing shows that the axle is bent the truck is pulled over to a vertical hydraulic press and the straightening is done readily without removing the axle from the truck. After the straightening the axle can be tested in the centers on the truck without re-The spring between the frame of the truck and the axle allows the truck to be depressed when the straightening operation is carried out and eliminates the necessity of taking the axle from between the centers. This method

HE accompanying line cut shows of handling bent axles eliminates the

been found that they can be straightened very much better cold. The practice of the railway heretofore was to heat axles and put them in a lathe, which required considerably more time and handling than the



*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.



YOUNG BROS. COMPANY 6520 Mack Avenue, Detroit, Michigan

District Sales Offices:

30 Church St., New York 1424 Guarantee Title, Cleveland 410 Granite Bldg., St. Louis 419 New Cali Bldg., San Francisco

988 Ellicott Square, Buffalo
20 E. Jackson Blvd., Chicago
807 San Fernando Bldg., Los Angeles
nelsco 248 Central Bldg., Seattle, Wash.
10 High St., Boston.



OVENS FOR

Core and mold baking.
Low temperature heat treating.
Drying.

Japanning and enameling. Electrical appliance baking. Adapted to all methods of heating.

INDUSTRIAL OVENS



You can prove the value of Page-Armco Welding Wire and Electrodes for yourself and your own job

Careful tests will show you that this carefully processed and thoroughly shop tested wire gives better welding results. What is more, it costs less to use when you figure complete welding costs of time and material. Workmen will tell you Page-Aimco Welding Wire is easier to use. It will pay you to investigate.



Page Steel and Wire Company
Bridgeport Connecticut



District Offices; Chicago, New York, Pittsburgh, San Francisco.

An Associate Company of the American Chain Company, Incorporated, Bridgeport, Conn.

PAGE-ARMCO

Welding Wire and Electrodes

ELECTRICAL INSULATION

.



and EMPIRE

Micanite and Super-Micanite Sheets, Commutator Segments, and Commutator Rings.

Micanite Tubes and Washers

Linotape, Seamless or Sewn Bias (Yellow or Black Varnished Tapes)

Empire Oiled Cloths and Papers (Yellow or Black)

Compounds, Varnishes, Etc.

Send for catalog and helpful booklet on Commutator Insulation and Assembly

MICA INSULATOR COMPANY

Largesi manufacturers in the world of mica insulation.

Established 1893

New York: 68 Church St. Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh
San Francisco Los Angeles

Cincinnati Seattle

Works; Schenectady, New York. Victoriaville, Canada; London, England

"American"



Light
and
Heavy
SPRINGS

Advantageous location for prompt delivery of raw materials—Ample equipment of modern automatic machinery and appliances — Pyrometer equipped furnaces assuring accurate, uniform heat treatment and over 35 years' spring manufacturing experience constitute a service which means satisfaction.

May we estimate on your needs?

AMERICAN SPIRAL SPRING & MFG. CO.

Established 1887

ARSENAL STATION PITTSBURGH, PA., U. S. A.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK-MISCELLANEOUS-30

Card Records Show Condition of Equipment*

BY ED. C. KELLY

Shop Foreman Virginia Public Service Company, Hampton, Va.

AR repair records are kept in a compact and readily available form in the shop of the Virginia Public Service Company, Hampton, Va. Cards 5 in. x 8 in. are used indexed with Smith's "Opnwindo" steel guides. The cards are kept in cases 10 in. $x \frac{1}{2}$ in. x 17 in., which provide a capacity for 1,000 cards.

All bearings, armatures, wheels, etc., are given serial numbers in their respective classes. To aid in following frequent changes in equipment the various parts and position on the cars are identified by numbers stamped near the pedestal jaws, or some other convenient place. Starting

PUT IN axle Bearing CAUSE OF REMOVAL 22

to number at one end, odd numbers are used on the left side and even numbers to the right.

In keeping records, armature bearings, axle bearings, wheels, etc., are entered on separate cards and are filed with each car record. As armatures are changed more frequently than other pieces of equipment these are given individual cards. Cards are filed with the record of the car in which the armature is operating, spare armatures being held under "shop" heading. Upon completion of a job involving a change of equipment permanent record is made on a "put in" slip.



Record cards and forms as used for equipment on the Virginia Public Service Company's lines

Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT-15

Concrete Ties Effect Saving*

, By Louis T. Botto Superintendent Maintenance of Way Department, San Antonio Public Service Company, San Antonio, Tex.

BY THE installation of concrete cross ties in place of wooden ties, a considerable saving in first cost has resulted on lines of the San Antonio Public Service Company, San Antonio, Tex. In the concrete construction it is general practice to build a temporary track around the work in order that the new construction may have fifteen days in which to harden. A job now in progress, however, is at a point where the company's tracks cross the switching yards of the I. & G. N. Railway. At this point it is impractical to build a temporary track, so the following method is used:

Every other wood tie is removed and in its place a concrete tie is cast. The construction includes a Carnegie steel tie, M-23, as the core. Tie bolts are placed in the bolt holes and are spot welded to the tie. The tie is then placed in position and blocked up under the rail, using bricks and shingles for blocking. Steel reinforcing wire is placed around the tie and spot welded in several places to the top of the tie. A form is then built around the tie and a 1:2:4 mixture of concrete poured, making the completed tie 8 in. x 10 in. x 7 ft. long. Ties are kept damp by



Concrete cross tie construction used by the San Antonio Public Service Company

sprinkling for fifteen days, after which the forms are removed and the regular tie clips are applied. Ties are tamped up with air tampers and the nuts are tightened down on the ties in the usual manner. Wood ties are then removed and the remaining concrete ties are installed.

No difficulty has been experienced in surfacing and lining track with concrete ties and it has been found as easy to do maintenance work as with the ordinary wood tie. It is felt that this type of construction is very desirable in close proximity to railway crossings which require frequent tamping.

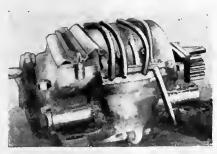
Electric Railway Journal Maintenance Data Sheet ROLLING STOCK—MISCELLANEOUS—21

Method of Bringing Out and Fastening Motor Leads*

BY EQUIPMENT DEPARTMENT Georgia Power Company

ONSIDERABLE trouble been experienced on cars operated by the Georgia Power Company from axle jumpers becoming oilsoaked and grounding. Motor leads also get down on the axle and cause trouble with split frame motors. To remedy these conditions duraduct is installed over the leads and brackets are welded on the motors for fastening wooden blocks to cleat the leads.

In addition to the cleating, all motors now being overhauled are rewired so as to eliminate the axle jumpers. The bottom field lead is



Motor with duraduct on leads and wood block supports



All leads are brought out at the top sides of the motor

run back around the motor case through steel bushings welded inside the case and is brought out through a hole in the top of the frame along with the other motor leads.

Steel bushings through which the leads are passed are welded to the motor frame and the leads are then bound together with tape to hold them securely. This not only holds the motor leads away from the axle but prevents vibration. This change is being made on Westinghouse type 101-B and C, 112-B-2, 306 and 307 motors.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT-16

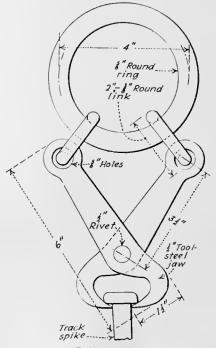
Convenient and Powerful Spike Puller*

BY JOSEPH MERCIER

General Foreman Track Service Division Montreal Tramways, Montreal, Canada

with hardened jaws, shaped to grasp great time saver.

POWERFUL spike puller that the head of a spike, are attached to may be utilized even where a 4 in. diameter by § in. round mildshoulder tie plates or cramped quar- steel ring with two heavy links. With ters interfere with free movement the jaws adjusted to grip the head of the claw bar has been devised by of the spike, a pull on a bar slipped the track service division of the Mon- through the ring as it rests on the treal Tramways, Montreal, Canada. adjacent rail will draw out the most Two tool steel tongs about 6 in. long stubborn spike. This has proved a



Spike puller

Adventures of

Old Man Trouble



on the

Hicksville Railway

Stay a safe distance behind the car ahead, even if you do have to be a few minutes late



If you wish to eliminate rear end collisions, follow the three Don'ts.

1—Don't let your cars play "chase the leader."
2—Don't let a car on a

2—Don't let a car on a slow schedule go ahead of a car on a fast schedule.

3—Don't let a car on time cut in ahead of a car that is late.

ELECTRIC RAILWAY JOURNAL will be glad to furnish press proofs of this page for posting on bulletin boards and will supply electrotypes of this series at cost for use in company publications.



New Equipment Available

Beaver Valley Machine Scrubs as Well as Washes Cars

CAR washing machines other than those in which water is sprayed on the cars from vertical or horizontal pipes are not usual in this country. Even the rather primitive spraying devices are by no means common among electric railway companies. A machine which scrubs as well as washes the car is very much of a novelty here, although there are machines of this kind in Europe.

A combined scrubbing and washing machine for electric railway cars in use in the New Brighton, Pa., shops of the Beaver Valley Traction Company is shown in the accompanying illustration. It has been patented by two employees of the Pittsburgh Railways and the one illustrated is the second to be installed. It resembles one used by the Pittsburgh Railways and described in the Journal for March 12, 1927. It consists essentially of three hinged arms on each side of the track, each set of arms carrying a vertical revolving brush, driven by chains from a vertical shaft driven by a motor. The arms are hinged so that they can be set to fit the width of the car to be washed. They have a range, in and out, of 9 in. on each side. In addition on each side of the track are two vertical perforated pipes. They supply the water sprays for washing.

After the arms are set to the proper width of the car the operation of the machine is entirely automatic. As the car approaches the washing machine a trip switch is thrown, starting the sprays and setting the revolving brushes in motion. One of the vertical pipes on each side sprays the car before it passes between the brushes. The second vertical pipe on each side sprays the car after it has passed the revolving brushes. The water in each case is directed toward the center of the track.

The water supply is arranged so that the water from the first set of vertical pipes can be chemically treated before it is sprayed on the car. The chemical used is the Imperial Company Simplex Cleanser, which is diluted to various degrees, depending upon the condition of the car and the extent to which it has to be cleansed. The second pair of vertical spraying pipes are supplied only with fresh water. Their purpose is to wash off all



This Beaver Valley machine washes and scrubs the cars at the same time. It is adjustable for various widths of cars

traces of the cleanser and the dirt which it has dislodged.

Old Westinghouse D-2 E.G. compressor motors are used for driving the revolving brushes, which are fitted with soft bristles.

Single Operator Type Welder

WELDING by one man is facilitated by a new machine announced by the General Electric Company, Schenectady, N. Y., as the latest addition to its standard line of welding equipment. The machine, which is rated at 300 amp. for one hour with 50 deg. C. temperature rise, includes a ball bearing motor-gener-

ator set with flexible coupling. Field control for the generator has been eliminated. The generator panel includes an ammeter and a voltmeter, but no field rheostat such as is customarily used. The meters have metal fronts except for the glass over the scale, thus minimizing the possibility of breakage. Motor starters for 60, 50 and 25-cycle motors are of the inclosed magnetic type. The direct-current motors use a simple resistance starter with a time switch.

The generator is designed to permit belt, motor or engine drive and for either stationary or portable use. It bears the General Electric designation WD-300-A.

Put "No-Nox" in your maintenance, so your cars will operate with no-knocks.

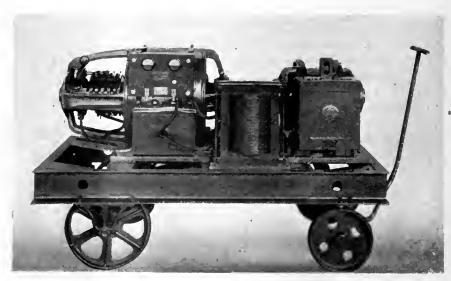
Improved Design of Reverser Finger

IMPROVEMENTS in reverser fingers for replacing the old V-shaped finger have been made by the Westinghouse Electric & Manufacturing Company. Use of this new type is said to result in better operation, longer life of both fingers and contacts and reduced maintenance cost. Other advantages claimed for the new design are:

1. Elimination of the riveted joints which loosen in service and cause heating, resulting in burning of fingers and contacts.

2. The shunt carries the current and the spring does not become overheated. This insures constant spring pressure throughout the life of the finger.

3. There is greater range of deflec-



New arc welder with alternating-current motor drive

tion within the prescribed pressure limits so that longer service is obtained from contacts.

4. The use of tinned contact surfaces reduces the resistance of the finger and prevents localized heating.

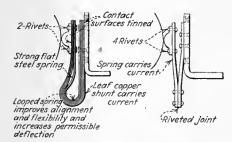
5. Contact tips are renewed more easily than with the older type. Due to contact surfaces being tinned, only two rivets are necessary to hold the contact tips of the fingers.

6. Greater flexibility insures proper alignment and maximum contact between contact tips and drum segments.

7. Longer life of finger segments is obtained due to reduced finger pressure and reduced heating.

The new reverser fingers have been standardized so as to use the fewest parts possible and permit the use of a relatively small number of finger assemblies to replace the old fingers. For the standardized design all copper tube terminals are fastened to the finger bases by means of through bolts. The tap bolts used on a few of the old fingers are eliminated.

For many purposes the new finger is entirely interchangeable with the old V-shaped finger. On some types of reversers it is necessary to change the strap terminal back of the finger when adopting the new finger. On a few other types, the fingerboard



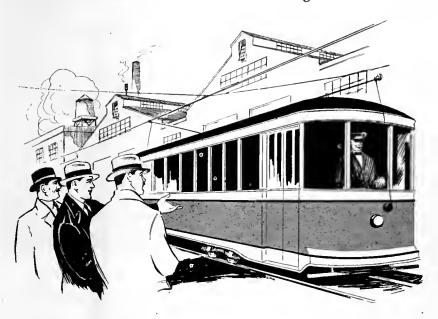
At left—New type of reverse finger. At right—Old finger which is replaced

must be changed or modified to permit its use with the new fingers. In every case the new fingerboard assembly using the new finger is interchangeable with the old fingerboard assembly.

When it is found necessary to replace the old V-shaped fingers, it is recommended that the reverser or changeover switch be changed to use the new finger. This should be done by substituting the new fingerboard assembly for the old fingerboard. At the same time the changeover is made the diameter of the drum should be checked. On type 173, 178, 279 and 284 reversers the finished diameter should not exceed $3\frac{1}{2}$ in. Wherever the contacts have been worn as much as $\frac{1}{16}$ in., they should be replaced with new cars.

Dick Prescott Paints a Car

And Starts a Train of Thought



SOME two weeks following the discussion of car painting by Dick Prescott, assistant superintendent of the Consolidated Railway & Light Company's shop, and Steve White, the carpeuter shop foreman, Dick Prescott called up Mr. Milburn, the general manager, and announced that a sample car, painted in the new color scheme was ready for his inspection.

Early in the afternoon Mr. Milburn appeared at the shop and Dick promptly had the newly painted carrun outside the building where it could be easily seen in the outdoor light from various angles.

Mr. Milburn stood back some distance from the car while Dick and Steve waited silently for his comments.

"Dick," he said finally, after looking at the car for some time from several positions, "I think that's an immense improvement. I can't understand why we didn't do something of this sore a long time ago."

"That's easily explained, Mr. Milburn," replied Dick, "I think there are two reasons: first we have never given much thought to the matter of improving the appearance of cars with paint, and in addition to that we have used colors which would stand up longest and hold costs to a minimum."

"That is probably true, Dick, but I believe that it was false economy. After all, paint cost is a comparatively small item in equipment main-

tenance. Even if we added to that item considerably it would not amount to very much money in comparison with the improvement that it makes in the appearance of our cars."

"I agree with you, Mr. Milburn. I think the added cost of keeping our cars well painted in attractive color combinations would be more than compensated for by the more friendly public attitude toward our service. That is an important step toward actual increased patronage by the people of the city."

"Dick, there isn't any question but that you're right. I think this makes an immense improvement in our cars. It will be good business to start in painting this whole group to attract some favorable attention while we are considering that new lot of cars we've discussed several times."

"Fine! Mr. Milburn, we'll get busy at once," exclaimed Dick. "These most recent cars of ours will look pretty good on the street when we finish with them. I do hope, though, that soon we can get rid of some of those old battleships on South Street. They're costing us a lot of money to operate and maintain, to say nothing of the way they look and ride."

"Come down to the office Friday morning, Dick, and we'll go over those figures again that you compiled some time ago," Mr. Milburn replied as he walked to the corner to board a street car bound down town.

Association Activities

Midwest Association Members Optimistic

Papers and discussions at the Hot Springs convention considered government ownership, pending legislation, franchises, transportation and mechanical problems

PTIMISM prevailed at the sessions Of the Midwest Electric Railway Association convention, which was held in Hot Springs, Ark., on Monday and Tuesday of this week. The 150 delegates present from seven states, including Utah, Colorado, Oklahoma, Missouri, Kansas, Nebraska and Arkansas, were given a most cordial welcome by Mayor Leo P. McLaughlin of Hot Springs and F. Leslie Body, manager of the Chamber of Commerce. F. G. Buffe of Kansas City, vice-president of the association, sounded the optimistic keynote of the street railway business today in responding, declaring that no organization could be in a state of hopeless decline which represented an investment of \$6,000,000,000 and carried more than 16,000,000,000 passengers annually.

Comparing industrial conditions in the United States with those in foreign countries, J. B. Wootan, editor Public Service Magazine, Chicago, attacked government ownership of industries as inconsistent with the principles enunciated in the constitution and voiced by

the founders of the nation.

In presenting a résumé of legislation pending in the present Congress Leslie Vickers, economist of the American Electric Railway Association, explained something of what the national association is undertaking to do through its New York and Washington offices to safeguard as well as to promote the interests of the electric railway industry. He urged that every effort be made locally in each state to keep its senators and congressmen adequately and intelligently informed concerning the problems of the electric railway properties in their particular territory.

F. Forman of Stone & Webster, in speaking of building a sales instinct in trainmen, stressed the value of public speaking instruction in helping organize an intelligent, judicious-minded body of railway employees.

There were two interesting luncheon sessions held the first day of the convention, which were turned into roundtable discussions of transportation and mechanical problems with T. G. Kelly of Fort Smith, Ark., and W. J. Martin of Miami, Okla., as group leaders. The banquet was the social feature of Monday's sessions and was addressed by Former Governor Charles H. Brough of Arkansas, who warned against the doctrine of government ownership, and hy

Walter M. Ebel, editor of the Hot Springs Sentinel-Record, who expounded sympathetically on the relationship which should exist between the press and the public utilities.

Tuesday's session was opened with a

COMING MEETINGS OF

Electric Railway and Allied Associations

Jan. 25—Central Electric Railway Master Mechanics' Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 25-26—American Railway Association, Motor Transport Division, organization meeting, Palmer House, Chicago, Ill.

Jan. 25-27—Electric Railway Association of Equipment Men, Southern Properties, Roosevelt Hotel, New Orleans, La.

Jan. 26-27—Central Electric Railway Association, Hotel Gibson, Cincinnati, Ohio.

Jan. 31—New York Electric Railway Association, midwinter meeting, Hotel Commodore, New York, N. Y.

Feb. 13-17—American Institute of Electrical Engineers, winter convention, Engineering Societies Building, 33 West 39th Street, New York, N. Y.

Feb. 17-18—Central Electric Railway Accountants' Association, Hotel Gibson, Cincinnati, Ohio.

March 23—Maryland Utilities Association, annual meeting, Emerson Hotel, Baltimore, Md.

May 2-5-Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention, Cleveland, Ohio. paper on the place of the bus in urban transportation, delivered by D. E. Druen, superintendent of bus maintenance of the Kansas City Public Service Company. Present-day bus construction, in the opinion of Mr. Druen, is fast incorporating qualities of increased speed, improved riding and greater ease of handling and is obtaining them with an ever-increasing simplicity in mechanical construction.

Lantern slides illustrating a large number of the latest developments in modern electric railway equipment were presented and discussed briefly by Claude L. Van Auken, managing editor of Electric Traction. About 50 slides were employed to show the product of the foremost car builders. Problems of municipal transportation, particularly as they concerned the functioning of the service-at-cost type of franchise in effect for the past eighteen years in Cleveland, Ohio, were discussed in a comprehensive paper by C. M. Ballon, City Railway Commissioner of Cleveland.

Entertainment for the ladies attending the convention was not overlooked. In addition to a splendid luncheon for them on the first day they were taken for a drive over the city of Hot Springs and to near-by points of interest through the courtesy of the Chamber of Commerce. One of the interesting features of the convention was the exhibition of the new 38-passenger, 110-hp., twin motor coaches manufactured by the F. R. Fageol company of Kent, Ohio.

R. Fageol company of Kent, Ohio.

The program of the convention was concluded with a short business session, during the course of which Charles Gordon, editor of Electric Railway Journal, was called upon by President Cobban of Miami, Okla., for a few remarks. Mr. Gordon spoke of the feeling of optimism which has begun to make itself felt in the ranks of the railway industry and expressed it as his belief that the decline in the business of providing mass transportation with street cars has been pretty well halted, with consequent hope for a return to more prosperous days.

New England Motor Bus Association Formed

ELECTRIC railways and steam railland Motor Bus Association, affiliating themselves with the American Automobile Association. The object is to promote co-operation and to give the public information about the motor coach transportation service, keep in touch with legislation and to work with the regulatory bodies in New England. Among the members are the following companies:

Union Street Railway (New Bedford), the Connecticut Company (headquarters,

New Haven), Worcester Consolidated, Springfield Street Railway, Boston & Maine Transportation Company (motor coach subsidiary B. & M.), Boston Elevated Railway, Middlesex & Boston, Interstate Limited Motor Coach Company (Fall River), Holyoke Street Railway, United Electric Railways (Providence), New England Transportation Company (motor coach subsidiary New York, New Haven & Hartford Railroad).

Officers have been elected as follows: President, A. P. Russell, president New England Transportation Company; vice-president, H. F. Fritch, president Bos-& Maine Transportation Company; second vice-president, Edward Dana, general manager Boston Elevated Railway; third vice-president, W. J. Flickinger, vice-president the Connecticut Company; fourth vice-president, A. E. Potter, president United Electric Railways, Providence; secretary, R. M. Sparks, vice-president Interstate Limited Motor Coach Company: treasurer, E. S. Wilde, president Union Street Railway, New Bedford.

New York Association Program

DETAILS of the program of the mid-winter meeting of the New York Electric Railway Association are now available. The meeting will be held at the Hotel Commodore, New York City, on Thursday, Jan. 31.

Subjects at the day session, begin-

ning at 10 o'clock a.m., are:

President's address.

"High-Speed Traction Motor," by N. W. Storer, consulting railway engineer Westinghouse Electric & Manufacturing Com-

Discussion, led by G. L. Kippenberger, vice-president and general manager St. Louis Car Company, and H. L. Andrews, assistant engineer railway department, General Electric Company.

"Local Transportation Must Keep on the Move," by Lucius S. Storrs, managing director American Electric Railway Asso-

ciation. Informal discussion from the floor led by W. H. Sawyer, past-president A.E.R.A., and R. F. Carbutt, president Metropolitan Section A.E.R.A.

"Do Traffic Lights Relieve Congestion," by R. W. Emerson, vice-president and

by R. W. Emerson, vice-president and general manager Cleveland Railway.

"Control of Traffic as it Affects Street Car Operation," by K. W. Mackall, engineer Crouse-Hinds Company.

"Moving Traffic," by Hon. Philip D. Hoyt, First Deputy Police Commissioner, in charge of traffic, City of New York.

"Traffic Signals and Their Effect on Street Railway Operation." by H. N.

Street Railway Operation," by H. N. Smith, consulting engineer Bureau of Gas

and Electricity, Syracuse, N. Y.

"Brakes as They Affect Schedule Speed and Accidents," by E. R. Fitch, district engineer Westinghouse Traction Brake Company.

Discussion led by J. S. McWhirter, superintendent of equipment Third Avenue Railway, and Hugh Savage, superintendent of equipment Brooklyn City Railroad.

The annual dinner will be held at the Hotel Commodore the same evening, beginning at 6:30 p.m. W. G. Gove, president of the association, will be toastmaster. The speakers will be Roland B. Woodward, general secretary Rochester Chamber of Commerce, and Captain Irving O'Hay, U.S.A. (retired.)

Buffet lunch will be served at noon on the day of the meeting. Those who desire to attend the dinner should make requests for reservations at once to the chairman of the committee, A. L. Hodges, assistant general Brooklyn City Railroad, 168 Montague Street, Brooklyn, N. Y.

Maryland Association Announces Meeting

ON MARCH 23, 1928, the Maryland Utilities Association will hold its annual meeting at the Emerson Hotel, Baltimore, Md. The program has not been completed but papers of interest to public utilities will be presented and discussed at the meeting.

Special Sleepers for Southern **Equipment Delegates**

SPECIAL Pullman sleeping cars will be provided for members of the Electric Railway Association of Equipment Men, Southern Properties, bound for their convention to be held in New Orleans, Jan. 25-27. The cars will be attached to the Piedmont Limited of the Atlanta & West Point Railroad at Atlanta. The train leaves at 4:20 p.m. on Jan. 24 and arrives in New Orleans at 7:20 the next morning.

Officers of International Association

THE full list of officers and execu-Tive committee of the International Street and Interurban Railway and Bus Association has been announced. Under the terms of consolidation of the two former European associations, representatives from Central Europe were elected to the governing body. names of the present officers follow:

President: F. de Lancker, Brussels. Honorary Vice-President: G. Pavie,

Vice-Presidents: Ch. Thonet, Brussels; A. Mariage, Paris; Max Drager, Berlin.

Members of executive committee: Ch. Rochat, Geneva; L. Boulle, Paris; L. Caufriez, Brussels; le Marquis de Foronda, Barcelona; Fr. Level, Paris; le Commandeur Salvadori di Wiesenhoff, Turin; le Commandeur Natoli La Mantea, Palermo,; J. W. Van Der Vegt, The Hague; L. Noirfalise, Liége; A. Falkenberg, Lilleaker, Norway; G. Hellgren, Stockholm; Al. Kulm, Warsaw; L. Graux, Brussels; Wilhelm Stein, Hamburg; O. Lowit, Mannheim; L. Spängler, Wien; St. von Sztrokay, Budapest.

Secretary General: A. de Backer. Brussels, Belgium.

American Association News

Rolling Stock

LAYING out and general discussion of work to be done by various special committees of the Rolling Stock Division for the year constituted the principal business of the general rolling stock committee at its meeting at association headquarters in New York City on Dec. 9. Those present were A. T. Clark, chairman; C. Bethel; W. C. Bolt; J. M. Bosenbury; R. S. Bull; J. A. Brooks; R. W. Cost; M. R. Hanna; A. D. McWhorter and R. B. Smith.

The various assignments to special committees were gone over and dis-Suggestions were made of things desirable that could be properly taken up by the chairman of the special committees. For special committee No. 1 on the review of the Manual, the branding of hose was discussed and recommended for study in connection with revision. In connection with the work of special committee No. 2 on motor coaches, it was considered desirable to make a study of motor coach lighting. This work, however, was in line with work being done by special committee No. 4, and so this committee will investigate the subject. Another subject considered for investigation by special committee No. 4 was headlights. Opinion was advanced that stronger headlights were desirable for city cars.

On assignments of subjects to last year's committees that were not completed, the work will be taken up at the point left off and an attempt made to complete it as soon as possible.

Louisville, El Paso and Wilmington Win Brady Safety Medals

THREE Anthony N. Brady Memo-outstanding acci-dent prevention and health promotion work on electric railways, for the year ended Dec. 31, 1926, have been awarded to the Louisville Railway, the El Paso Electric Company and the Tide Water Power Company of Wilmington, N. C. The Pittsburgh Railways received honorable mention and was voted a certificate. Announcements of the awards have just been made jointly by the American Museum of Safety and the American Electric Railway Association.

The medal awards for 1926 were made to the three electric railway organizations graded according to receipts, making the best record in accident prevention and health promotion, according to records submitted. One prize is given in the class of companies operating upwards of 5,000,000 vehiclemiles, one for companies between 1,000,-000 and 5,000,000, and one for companies with less than 1,000,000 vehiclemiles. The committee's purpose in this, it was announced, was to promote active competition for the awards by every electric railway, however large or small.

News of the Industry

Patrons in Biddeford Desire Fare Boost and Continuance

An unusual petition signed by residents of West and Granite Streets in the city of Biddeford, Maine, has been presented to the officers of the Biddeford & Saco Railway asking that the present fare of 5 cents be doubled. The petition, signed by about 50 residents, asks that the increase in fare be granted in order that the line may be continued in operation.

When the York Utilities Company abandoned its line hetween Biddeford and Kennebunk, the Biddeford & Saco Railway continued to run cars over the line from City Square to Proctor Road in North Kennebunkport. Following a short trial period the company found that this operation did not pay, and it was then cut down to a distance of about $2\frac{1}{2}$ miles on a 5-cent fare with a half hour schedule for ten hours daily. But when service could not be maintained under the present fare tariff, the officials discontinued the service, and notice was given that no cars would be run after Jan. 14.

The petition, however, reopened the question and it is understood that the railway officials will take the matter up with the Public Utilities Commission in an effort to work out some new plan. The road is desired for the convenience of employees and other residents.

Increased Fare Asked in Tulsa

The Oklahoma Union Railway, Tulsa, Okla., has applied to the State Corporation Commission to increase fares on its lines in Tulsa. The rate asked is 10 cents for a single fare and 25 cents for three fares sold at one time. The former rate was 7 cents for a single fare and 25 cents for four fares.

The rate asked is higher than that recently granted to the Tulsa Street Railway; the latter company receiving 8 cents for a single fare and 15 cents for two fares.

According to O. M. Sewell, vice-president of the company, the increase is asked in order to put the fares on a parity with those of the bus lines which the company operates through a subsidiary concern, the Union Transportation Company. The bus lines were granted the higher rate more than a year ago.

The application does not ask for increases on the lines out of the city. In asking for the increase the company filed a statement alleging that it has sustained an operating loss of \$377,152 since 1923. It claims that even the increase will not entirely overcome this loss as the increased amount to be raised yearly is estimated to be only \$30,950.

A reason for asking the increase is that transfers can be issued between the bus lines and the railway. At present the difference in fares on the two forms of transportation makes the issuing of transfers impossible. It is also said that a transfer system would be arranged between the O.U.R. lines and the Tulsa Street Railway if the new rates are granted. Transfers between the two railway lines are in effect, although the Tulsa Street Railway has recently been enjoying a slightly higher fare.

The case has been set for hearing at Oklahoma City on Feb. 14.

New Rochester Line Not Ready for High Speed Operation

After a little more than a month of operation, the \$12,000,000 subway at Rochester, N. Y., has been found unfit for high-speed traffic until tracks are reballasted and other faults corrected, at a total cost of at least \$50,000.

This disclosure was made after an inspection trip by city and railway officials. It has become a live political issue in Rochester, threatening a split between the new city manager government, which took office on Jan. 1, and the old Republican machine politicians.

It was found that before the subway was ready for the high-speed schedule planned for it this month, with installation of the block signal system completed, much reballasting must be done along the 8-mile stretch of trackage in the abandoned Erie Canal, sharp curves must be eliminated, leaky platform roofs at stations repaired and a general cleanup of the cut made.

Officials of the New York State Railways were emphatic in declaring that under no circumstances should the company be obliged to fix up the road, as it was supposed to be in running order when it was handed over by the city for a three-year trial operation.

The subway was opened for partial operation on Dec. 1, but it was hoped to have it in full swing by Jan. 15, a hope that has gone glimmering with the discovery of the flaws in the line.

Fare Increase in Youngstown With Weekly Pass Restored

A new fare schedule calling for 10 cents cash on both buses and cars, a no transfer charge, six tickets for 50 cents and a weekly pass for \$1.50, on the lines of the Youngstown Municipal Railway, Youngstown, Ohio, is to be given an eight weeks' trial. In voting for this increase in fare the City Council set Feb. 5 as the beginning date. The present fare is 8 cents cash, seven tickets for 50 cents with a 1-cent transfer charge. Service improvements are authorized.

Utility Investigation Meets Criticism

Opposition varied by companies, commissioners and bankers to Senator Walsh's resolution. Senator Lenroot issues challenge to Senator Walsh

VIGOROUS opposition to the Walsh resolution—opposition of a character calculated to impress Congress more than any that could be exerted by the utilities themselves—has come from the utilities commissioners of the states, from investment bankers and from representatives of securities owners.

When Senator Watson of Indiana called the interstate commerce committee of the Senate to order on Jan. 16 he said that the committee must consider the advisability, necessity and expense of an investigation into the conduct of public utilities of the far reaching character indicated in the resolution which he read. Thereupon Senator Walsh, made a long statement in justification of a minute inquiry by a special committee of the Senate into virtually every phase of the public utility business. He asserted in the course of his argument that "there is a view entertained by not a few people that the state commissions are not really functioning as they should because these utility corporations are constantly contributing large sums to control elections, and in one way or another they thus control state conventions."

A committee representing the National Association of Railroad and Utilities Commissioners made a special point of Senator Walsh's statement in a report which was submitted to the committee at its subsequent session. The report concludes:

The commissions declare themselves opposed to invasion by the federal government in any manner of the rights of the sovereign states in the control and the regulation of public utilities. Therefore these commissions are opposed to any action of Congress that might result in an invasion of state rights or the substitution of national for state utility control.

Henry R. Hayes, president of the Investment Bankers Association of America, said:

The public utility industry is now in a very desirable condition of prosperity. The reason for this is because, as a whole, it is economically sound throughout. It supplies "products" the usefulness of which is constantly growing and virtually universal and unlimited. Through its technical, managerial and financial progress it has consistently effected improvements and expansion to meet, economically and efficiently, the ever-increasing demands of the public. It is ever a pioneer, going continually into new fields, even today bringing electric service to the farmer in a degree not practical a few years ago. It is a vital part of the industrial, the civic and

the home life of the nation, an integral factor in the country's prosperity, its creation and distribution of new wealth.

The committee on Wednesday heard the argument of former Senator Irvine L. Lenroot, counsel for the Joint Committee of National Utility Associations.

Senator Walsh on Monday read into the record an interview in the Brooklyn Eagle with Owen D. Young, chairman of the board of the General Electric Company, in which he stated that the utilities would not oppose an investigation. Mr. Lenroot read a part of that interview in which Mr. Young declared that the utilities would not oppose an investigation by proper authorities when specific charges had been made. Mr. Lenroot insisted that no specific charges had been made against the utility companies and issued a direct challenge to Senator Walsh to show the contrary.

Ten-Cent Fare for Macon

Ten-cent fare for the casual rider with four tickets for 30 cents will go into effect sometime in February, after the Macon Railway & Light Company, Macon, Ga., has finished \$314,000 in improvements now being installed in an effort to bring more patronage to the transportation system. L. A. Magraw, general manager of the company, said:

There is no widely established precedent to indicate that the improved service and equipment will in any way increase the patronage of the system. It is only a hope that this expenditure will provide in Macon a solution of the problem being faced by transportation companies in all of the smaller cities and most of the larger municipalities. This problem has manifested itself during the last eight years through decreased patronage brought about by automobile competition.

The twelve new cars that have been ordered by the company will arrive and be put into service upon completion of the new tracks. Many schedule changes that will have a tendency to offer increased service during the rush hours will be put into effect, it is understood.

Petition for Special Transit Session Approved in Chicago

In the belief that so clear an expression of the desires of citizens of Chicago would virtually force Governor Len Small to call a special legislative session to consider the city's traction enabling bills, the City Council committee on local transportation on Jan. 16 approved a plan to circulate a petition for 100,000 signers urging the Governor to convene the legislature for a second time since the close of the regular term last summer.

Forty thousand petitions, each bearing space for 25 names, are to be sent out immediately by the committee to large industrial plants, clubs, and civic organizations for their aid in obtaining signatures.

The five transit bills representing the city's views have not been put in final form yet, but it was indicated at the

councilmen's meeting that they would be ready if the Governor should call a special session.

Lavish Christmas Decoration in New Jersey

Public Service Terminal Building, Newark, N. J., the main office of Public Service Corporation of New Jersey and its various subsidiary companies, was elaborately decorated for the Christmas holidays. Many of the commercial office buildings in various parts of New Jersey also were decorated in keeping with the holiday spirit. Carhouses and garages of the transportation companies had Christmas trees.



Proclaiming Christmas in New Jersey

The entire front of the building on Park Place was trimmed with garlands and lights, from the top to the first floor. The garlands were draped in graceful loops at the eaves and hung in vertical lines of various lengths over the face of the building. Huge wreaths and Christmas trees were placed against the grilled arches between the first and third floors and were electrically lighted. Seven huge lighted red candles were placed on the ledge above the second floor cornice. They ranged in length from 10 to 40 ft.

On the Canal Street side there were wreaths and trees similar to the decorative scheme employed on the arches between the first and third floors on the Park Place front. At the extreme top of the center flagpole a 3-ft. high illuminated star was set and streamers were draped from the pole to the edges of the roof.

Postponement Sought in St. Louis Rate Case

Another postponement of at least three months in the hearing by the Missouri Public Service Commission in the valuation rate case of the St. Louis Public Service Company was requested on Jan. 9 by City Counselor J. T. Muench of St. Louis. The commission took the request under advisement.

The original application for a straight 8-cent fare was filed on June 3, 1926,

and the company completed its case last May. At that time the city was granted six months in which to prepare an answer. A temporary increase from 7 cents to 8 cents, or two tokens for 15 cents, was granted by the commission on July 5 last, and will stand until the rate case is completed.

Contracts With Labor Unions Opposed by Detroit Commission

A resolution opposing working agreements with any labor union has been passed by the Detroit Street Railway Commission. This move was prompted by the demand of the business agent of the Detroit branch of the International Brotherhood of Firemen, Oilers, and Railway Laborers that the Detroit Street Railways enter into a working agreement with the members of that union. The agreement proposed, it was reported by the secretary of the commission, was intended to apply only to union members and would require the employment of all union men eight hours a day and six days a week.

It is the sense of the commission "that the unionizing of this or any other governmental agency or department is improper and opposed to public policy." Also "that the regulation of wages and working conditions in such department must rest with the governmental agency established to carry on the particular enterprise; that since this railway is owned by the city of Detroit, it is the property of all citizens of the city, and they all have equal rights in its opportunity for employment." further states that while membership in a union is not properly an objection to any employee, membership in no organization can be allowed to give any employee special privileges or advantages over other citizens who do not belong to such organization.

Increase in Fares Between Canton and Massillon

The Public Utility Commission has granted the Northern Ohio Power & Light Company, Akron, Ohio, permission to increase its rates between Canton and Massillon as follows:

F	Rate, in	Cents
	New	Old
Canton to Massillon	20	15
Canton to Jackson Lane	15	10
Canton to Whipple Road	06	05
Whipple Road to Jackson Lane.	10	0.5
Whipple Road to Massillon	15	10
Jackson Lane to Massillon	08	05

The round trip between Canton and Massillon is to be 30 cents. The former round-trip rate between these two points was 25 cents.

Commuter rates between Canton and Massillon are increased from 50 for \$5 to 20 for \$2.50.

The action of the commission follows the failure of the Commissioners of Stark County to grant an increase in rates.

Sunday "Passes" in St. Louis

Permission to sell "passes" over the lines of the St. Louis Public Service Company within the city of St. Louis effective Jan. 15 was authorized by the Missouri Public Service Commission on Jan. 9. City officials raised no objec-

tion to the proposal.

The order covers Sundays and holidays. Passes will be sold for 25 cents and will be good from 3 a.m. on date of purchase to 3 a.m. the following day. They will entitle the bearer to unlimited transportation on street cars within the established fare zone in the city limits. The purchaser may turn the pass over to other persons, but only one person may use the pass for the same trip.

Stanley Clarke, vice-president of the St. Louis Public Service Company, told the commission that his company wanted to stimulate the habit of car riding on

Sundays and holidays.

The privilege to roam all over the city fare zone of St. Louis on a Sunday for 25 cents met quick appreciation from the public of St. Louis on the opening day, Jan. 15. Although the morning weather was raw and clammy enough to discourage early riding, 20,432 passes were sold. The pass cost equals 3.3 times the token fare of $7\frac{1}{2}$ cents. Most of the sales were made to adults, inasmuch as the fare for children between five and twelve years of age is only 3 cents. Included in the favorable comment in the newspapers was the following piece, on the order of that used by Walt Mason, published in the *Post-Dispatch*:

WE SING THE SUNDAY PASS

The street cars run on Sunday, just the same as through the week, but we have no Sunday rush-hour when the traffic hits a peak. Forgotten then the office, the business that we keep, while some of us go riding and sundry others sleep. The solitary grandeur of the Sunday street car's past; for two bits we can ride about as long as Sundays last. When we weary of the riding and we close our heavy lids, the pass is still transferable to mamma and the kids. So, ho, the Sunday street car pass in merry roundelay; just give the man a quarter and he'll let you ride all day. Sing loud the Sunday street car pass in lilting, swinging ditty; we'll give the man a quarter and we'll ride about the city. Sing, ho, the Sunday street car pass in unrestrained, wild glee, we'll ride around the city till the shining hour of three. But when of riding round the town too suddenly we bore, why not let us view the country, say, for 30 cents or more?

The More You Ride the Cars the Better the Service Will Be

According to *Industrial News* of Lansing, Mich., there is talk of the city employing a transportation engineer to work with the Michigan Electric Railway and the city to study service and see that details of the agreement between the company are carried out in the interests of the citizens of Lansing.

The company now has a working agreement for three years with the city. The debt to the city is being paid at the rate of \$2,500 a month. Each

month the company must report its condition to the public utilities department including earnings and expenses. As the *News* sees it the question of greatest interest to the public is service. On this matter the commentator said:

The car-riders have this matter in their own hands. In general the citizens of Lansing themselves determine the service.

The worst kickers on service are those people who ride the cars only when the snow is deep and they cannot drive their own cars, but they expect the street cars to go through without any trouble. When a storm such as was experienced a week ago strikes Lansing the railway works 24 hours a day to keep the tracks clear and the cars running on schedule. The more you ride the cars the better the service will be. Perhaps a transportation man could figure out a better way to give service.

Increase to Ten Cents in Cairo

Fare in Cairo, Ill., is to be raised from 7 cents to 10 cents under a new plan advanced by the Illinois Power & Light Corporation, which owns the city and interurban lines in that city. Under the new plan books of twenty tickets will be sold for \$1.25, and a 3-cent fare for school children will continue. Hearing on the new rates was conducted recently before Judge George W. Pillow, assistant commissioner of the Illinois Commerce Commission. A. C. Hall, assistant general manager of the company, cited the automobile as the cause of the decrease in the number of passengers hauled by the street cars. .. The city lines carried 1,262,000 passengers in 1920 and only 515,000 in 1926.

Decorate Car in Gary for Public Guessing Contest

To arouse greater interest in street car service and as a stimulus to traffic the Gary Railways, Gary, Ind., recently announced a prize contest in which cash awards aggregating \$100 would be made for the fifteen answers which most nearly approximate the exact number of passengers carried during the 30 days ended Feb. 12 by a single designated street care operated in the city. One of the company's new 52-passenger one-man, double-truck safety cars has been appropriately decorated for the contest, the sides and front and rear dashes of the car being painted white and labeled with the terms of the contest in bold letters. The car will be operated during the contest period.

The contest is open to everyone except employees and their families. Blank cards are available for "guesses" to be turned in to office.

The entry blanks also provide space for recommendations or suggestions as to how the service may be improved. The entrant need not fill out this space, however, if he does not wish.

The first prize of \$35 and fourteen other awards of smaller amounts will be distributed at the close of the contest. Mayor Floyd Williams and other prominent citizens of Gary will act as judges.

Seattle Fund Plan Fails

The two most recent projects planned in the City Council of Seattle, Wash, to provide financial aid for the Seattle Municipal Railway—one for a loan to be made from the light department, and the other for submitting to the voters a proposed ordinance appropriating money from the general fund—have been killed in Council, in committee of the whole. This action also kills any immediate plan to return to the 5-cent fare basis, as proposed by Councilman Oliver T. Erickson, in his bill providing for invading the general tax levy to aid the Seattle Municipal Railway.

to aid the Seattle Municipal Railway. Councilman W. T. Campbell's measure provided for a loan of \$400,000 from the city light funds to take care of operating expense while the railway is accumulating \$1,100,000 to meet bond interest and principal due March 1.

Certain business groups urged the Council to postpone action until the business men's survey of the railway problem now under way is completed, and a comprehensive program for permanent relief recommended.

Meantime, employees of the Municipal Railway numbering about 2,000 received their last pay in interest-bearing warrants, stamped: "Not paid for lack of funds." Payroll checks of \$128,329 were cashed by merchants.

A Free Hand for Detroit Department Heads

In the light of the purchase obligations and the rapid expansion of Detroit, the Department of Street Railways, Detroit, Mich., has performed well and creditably. This statement was made part of Mayor Lodge's first communication to the Common Council in which he mentioned various departments of city government. He further stated that the Street Railway Department was top heavy in several divisions with an excess of employees but that a notable start had already been made toward weeding out duplication of effort.

Service, not profit, in the Mayor's opinion, should guide the department's management in every operation and the better handling of "the thousands who daily use the street cars and buses, should be studied closely and their requirements met as quickly as possible."

He said that in co-operation with the Rapid Transit Commission, whose studies of future traffic and transportation needs must continue, and in conjunction with all other city departments having to do with Detroit's streets and highways, the Street Railway Department was to lead in the solution of present transit problems.

In his communication he pointed out that during the coming administration the head of each department would conduct its business without interference either from him or any person, official or unofficial, but that he would consult with the department heads from

time to time.

Relief Plan for Susquehanna Trail Proposed

· One track at least of the Valley Railways in Lemoyne, Pa., is on the public highway according to J. L. Shelley, Jr., the state highway department expert on contracts. The highway department has presented a plan for permanent relief of traffic congestion at the "bottleneck" which includes paving, removal of overhead bridge pillars and street car track relocation all the way from the river to Rossmoyne Street, Lemoyne, where the road to York joins Carlisle pike.

Four estimates on the cost of the project designed to relieve permanently the traffic congestion existing in what is termed "bottleneck" from the western end of the river bridges to Rossmoyne Street, Lemoyne, were prepared by P. M. Tebbs, an engineer for the State Highway Department. They vary from \$106,-504 to \$168,299.

The undertaking involves under one of the plans, a new bridge carrying the low grade-line of the Pennsylvania at the entrance to the river bridge. provides that the tracks be moved to the middle of the highway, with the necessary switches and connections with the carhouse and with the highway constructed of concrete forty feet wide.

This, an important section of highway, carries all the traffic of the Susquehanna Trail, plus the great volume that flows up and down the Cumberland Valley, the Gettysburg traffic and all this on top of the rapidly increasing local traffic between a city of Harrisburg's size and its populous suburbs on the west shore.

Trade of Unprofitable Detroit Lines to State Suggested

Fred W. Green, Governor of Michigan, has suggested to attorneys for the Detroit United Railway that rights-ofway of unprofitable lines be traded to the state for use for trunk-line highway purposes in return for all or part of the back taxes in excess of \$800,000 due the state.

The report from Lansing, the state capital, cited that four of the lines of the Detroit United have paid no taxes since 1921 until this year, when payment of about \$150,000 was made upon threat from the state to force a sale of some of the properties.

Schenectady Petition Must Be Heard

A motion made by the city of Schenectady, N. Y., for a dismissal of the petition of the Schenectady Railway to increase its fare to 10 cents cash has been denied by the Public Service Commission. Resumption of hearings before the commission on Feb. 1 was further ordered.

The city contended that certain franchises granted the company limit the rate of fare within the city to 5 cents and that the commission had no power to fix a fare in excess of 5 cents without a waiver of those restrictions by the city. But the commission held among other things that under the railroad law of the state the Legislature and the commission had the power to regulate fares on all lines operated under franchises which required compliance with the railroad law, and further it held to the opinion of the Court of Appeals in the Troy and Binghamton railway fare applications that earlier franchise conditions restricting rates of fare were waived by the granting of later franchises containing provisions on complying with the railroad law.

Prosperous Year for Salt Lake City Employees

A surplus of \$9,919 has been divided among the members of the Traction and Power Mutual Aid Association composed of employees of the Utah Light & Traction Company and the Utah Power & Light Company, Salt Lake City, Utalı. Nine hundred and fifty-nine members participated in the distribution.

Good Cheer Converted Into Good Will in Little Rock

During the Christmas holidays of 1927 the Arkansas Power & Light Company, Little Rock, Ark., placed a selective group of transportation, sales and service men at strategic points in the downtown area of the Arkansas capital. Regular uniformed men from the railway department were assigned to the task of assisting the Christmas shoppers in boarding the street cars in the more congested districts. While these men were equipped to sell tokens and make change their principal job was to carry bundles, assist aged and infirm persons and those with children. The duties were summed up under the blanket order, "Render any service feasible for the convenience of the street car patron."

The "Service Men" was an outgrowth of a "Service Boy" scheme worked out by the Arkansas Power & Light Company last November when the Arkansas Education Association held its annual convention at Little Rock. that time 25 boys from the Little Rock Boys' Club were employed to act as guides, or pages for the visiting teachers. These "Service Boys" were stationed at the railway stations and important downtown intersections for the purpose of directing the visitors, carrying baggage or rendering any other service practicable for the convenience and pleasure of the delegates. So popular was this service that the company decided to extend the plan during the pre-Christmas season and started a more substantial service to the home people. With this in mind, men rather than boys were selected for the task.

A vast amount of good will resulted to the company in both cases. Local newspapers carried stories and printed pictures of the "Service Boys" and the "Service Men."

Is Poverty an Adequate Defense Against Reconstruction Work?

The Nebraska Supreme Court has been asked by the Nebraska Railway Commission to support it in its controversy with the Omaha & Southern Interurban Railway, Omaha, Neb., that the financial condition of the railway is not a sufficient defense for its refusal to obey an order that it reconstruct a bridge over its rails in Sarpy County, so that a highway may be carried across it. Because of its steep grades the highway had fallen into disuse since the automobile became so generally adopted, and when the bridge became unsafe for use the interurban company declined to rebuild it. The county commissioners filed a complaint and the reconstruction order of the State Railway Commission followed.

On its appeal the company challenges the authority of the commission to make such a condition in its order and also challenges its jurisdiction over railway crossings.

On the question of financial condition the commission states that the plea of prospective bankruptcy following obedience to an order requiring the expenditure of money cannot deprive it of its right to insist that necessary duties devolving upon the utility be performed. It contends that while intelligent selfinterest will dictate that a regulatory body do not impose burdens upon the corporation such as will force it to cease service the question rests entirely with the state. It rules that the claim that the utility cannot afford the expense incurred by obeying an order is not available to it as a defense, so long as it has the alternative of withdrawing from business entirely.

Paving Relief Agitation Renewed in New York

Announcement has been made that at a meeting in Albany of the committee named by the Mayors' Conference with the committee named by the electric railways it was voted to request the state tax department to draw a paving relief bill satisfactory to both the cities and the companies.

Harry B. Weatherwax, vice-president of the United Traction Company, Albany, N. Y., member of the special railway committee, and William P. Capes, secretary of the New York State Conference of Mayors, will be the spokesman for the two special bodies. The committee of two will call on the state tax experts this week. When the tax department has prepared its bill. copies will be sent to the railway and cities of the state, with requests for

prompt expressions of views.

At the Niagara Falls meeting, the New York Electric Railway Association asked the Mayors' Conference to name a special committee to confer with one from the association "in an endeavor to come to some agreement in this matter (paving between tracks) which will be satisfactory to all concerned."

Public Utility Course for Business Executives

A six weeks' summer course in public utility management and economics for business executives will be given from July 9 to Aug. 18 by the Harvard University Graduate School of Business Administration, Soldiers Field, Boston. Mass., under Philip Cabot, professor of public utility management, and D. W. Malott, instructor in this subject. The course will cover various legal, economic, engineering and financial phases of management and will include a study of court and commission decisions covering valuation, depreciation and fair return, besides cases from company practice in methods of marketing, ratemaking, operation, finance, customer relations and the broad economic problems of production. The course will require the full time of the student, classes meeting for four hours daily. The case method will be followed throughout.

A similar course was given last summer with 35 public utility executives from all parts of the country in attendance, and the forthcoming course is the outcome of the success of the former. Miss M. B. Fox is secretary of the special session for business executives.

Lower Fare on Massachusetts Line

A reduction to \$I has been made in the round-trip bus fare between Worcester, Mass., and Webster by the Worcester Consolidated Street Railway. The round-trip fare has been \$1.10 on both the Consolidated and the Acme lines. The reduction was made at the request of the Selectmen.

Dining Car Service on Milwaukee-Watertown Line

Dining car service was established on Jan. 16 on the interurban line of the Milwaukee Electric Railway & Light Company between Milwaukee and Watertown. The equipment for this service was built at the company's Cold Spring shops. Every kitchen operation from refrigeration to cooking is done electrically. Table d'hote and 'à la carte service will be provided on three west-bound and three eastbound trips daily except Sunday.

The new dining car service will be tied in directly with the company's Madison buses at Watertown. The train itself is unusual. It is mounted on three special trucks designed for easy riding. The two coaches are joined by a passageway between the passenger and the dining cars. The train is 90 ft. long.

The leading coach is identical in finish with the de luxe coaches now operated on the rapid transit lines. It includes smoker and baggage compartments. The diner seats sixteen persons at a time. The tables are of steel and

the chairs of aluminum frame, with spring seats and leather upholstery. The train is so arranged that additional passenger coaches may be attached and operated in multiple if the traffic should warrant.

Institutional Campaign Launched by American Water Works

A six months' institutional advertising campaign in magazines has been started by the American Water Works & Electric Company, controlling company of the Monongahela West Penn Public Service Company of West Virginia. The purpose of the campaign is to stress the various aspects of the service of subsidiary companies such as impartial rates to all consumers, stability of business and emergency services. It is hoped that the series will appeal to the consumer and the investing public.

\$275,000 Pledged for San Francisco Line

A resolution pledging \$275,000 for the completion of work on the Judah Street line of the Municipal Railway of San Francisco, Cal., has been adopted by the Board of Supervisors. The money will be included in the next budget of the board to pay for the construction if the city is enjoined from paying for the contracts out of the Municipal Railway funds. According to a press report the question now is: What will happen to the suit brought by "A Taxpayer" to prevent the use of Municipal Railway funds for Municipal Railway construction?

Judge Murasky in the Superior Court has already ruled in favor of the city's right to use Municipal Railway funds for Municipal Railway construction, and the city attorney is confident that this ruling will be sustained by the State Supreme Conrt.

Proposed Increased Wage Scale in St. Louis

Wage increases ranging from 5 to 10 cents an hour have been tentatively decided upon by the 4,500 union employees of the St. Louis Public Service Company, St. Louis, Mo., and will be presented shortly in the form of a proposed new wage scale and working agreement to company officials. A tentative draft of the new schedule met with the approval of the majority at a meeting of the car men held on Jan. 9.

The present wage scale of motorman and conductors ranges from 50 to 67 cents an hour. These workers would receive a raise of 5 cents an hour if the tentative scale is finally adopted. About 3,500 motormen and conductors are employed by the company. Including other workers, such as shopmen, mechanics and maintenance men, there are 50 classifications and each has a different wage scale.

Baltimore Studies Chicago Parking Law

The United Railways & Electric Company, Baltimore, has sent Dean J. Locke, assistant superintendent of the traffic department, to Chicago to make a study of the results of the new ordinance which prohibits parking in the Loop district. The situation in Chicago is said to be similar to that which exists in Baltimore and which the United is trying to improve. Mr. Locke also will study traffic conditions in other cities, including Pittsburgh, Cleveland and Detroit.

Utility Scholarships Announced by University of Illinois

Graduate scholarships and fellowships in the Economics of Public Utilities for the year 1928-1929 have been announced by the University of Illinois. They will consist of three fellowships of \$800 each to third-year graduate students; five fellowships of \$600 each to second-year graduate students and seven scholarships of \$400 each to first-year graduate students. Eligible students must possess a bachelor's degree from a Class A college or university, must have demonstrated excellence in scholarship, and a proper foundation in economics. No application will be received after March 1. Awards will be announced on April 1, 1928. Further information can be obtained from Dean Charles M. Thompson, College of Commerce and Business Administration, University of Illinois, Urhana, Ill.

Bread and Street Car Tickets in Atlanta

Arrangements have been made by the Southern Grocery Stores, Inc., operators of the Rogers chain stores, whereby two wrappers from the popular loaf of bread, accompanied by a nickel, entitles the holder to a street car ticket good on the lines of the Georgia Power Company, Atlanta. Four wrappers and 10 cents will buy two tickets, and so on with the same ratio. It is stated by officers of the company that they have bought at the regular rate of 7½ cents each a large quantity of tickets and have distributed them to the various stores in and around Atlanta. The offer will continue indefinitely, it was stated.

Edward Dana Honored

At the annual meeting of the directors of the Massachusetts Safety Council, held during the week of Jan. 7, Edward Dana, general manager of the Boston Elevated Railway, Boston, Mass., was elected to the presidency. He succeeds Howard Coonley, retired after six years of service. Mr. Coonley remains on the board, and retains his full interest in the work of the council. His successor has served as vice-president of the organization.

Beeler Report Discussed in Cincinnati

The Public Utilities Committee of the City Council of Cincinnati, which consists of Tylor Field, chairman; C. O. Rose and Fred Schneller, met recently to consider a motion presented by Stanley Matthews, Vice-Mayor, and referred to the committee. As a result a motion was prepared which will be submitted to the Council and if passed will open the way for negotiations immediately with the Cincinnati Street Railway for the operation of the rapid transit system.

The new motion was prepared mainly because the committee had before it another motion presented by Mayor Seasongood several weeks ago, calling upon the City Manager to investigate and report on the Beeler report, and it was thought desirable to combine the two. The motion as prepared is as follows:

That the Public Utilities Committee be directed to confer with the Rapid Transit Commissioners, the Cincinnati Street Rail-way and the committees of semi-public bodies in regard to the Beeler report on the rapid transit system, and to report in three months the progress made, and that the City Manager is directed to assist the

Mayor Seasongood contends that a subway in a city of less than 1,000,000 inhabitants will not be a paying proposition and also objects to the completion of the system on the ground that it will in fact benefit outlying municipalities to a greater extent than it will Cincinnati but with Cincinnati paying the entire

Other Councilmen, chiefly Mr. Matthews and Mr. Rose, say that it is too late to bring up the objection of benefiting outlying communities. They contend that more than \$6,000,000 has already been spent and that it is only logical under the circumstances to proceed and finish the job.

Unusual Strike in Pennsylvania

Emergency bus operations in the territory of Pottsville, Pa., and its vicinity has been in force since Jan. 6 when employees of the East Penn Electric Company walked out as the result of the inability of the company and the men to agree on the inclusion of the word "subsidiary" in the new contract.

When the agreement with the union expired on Dec. 31, 1927, a similar contract was offered to the men without any change. It was agreed to by them with the exception that they demanded the word "subsidiary" be placed in the preamble of the contract, and a bus clause embodied in the contract which would cover any future bus operation. It is said by some that the men have the idea that the railway proposes to abandon some of the lines and replace the service with bus operation. This viewpoint has been termed erroneous by company officials who have tried to make it clear to the men. They in turn insist on a bus clause and the word "subsidiary" being inserted in the preamble.

Meanwhile the Pennsylvania Public Service Commission through its representative, Harvey Rose, has placed buses throughout the territory with men in charge who are holders of certificates in different localities in and about Schulykill County. The public, apparently unaffected by the strike, is riding the buses and from all reports is much in favor of the company's refusal to enter into any such contract with the

Parking in St. Louis Under Scrutiny

An ordinance to eliminate daytime parking except for commercial vehicles in the downtown section of St. Louis, Mo., has been prepared by Director of Streets and Sewers Brooks. The bill will also provide more drastic regulatory parking measures for a larger district surrounding the downtown congested

Foreign News

in Scotland

Greenock and Port Glasgow Tramway, Glasgow, Scotland, has withdrawn its tramway services on Sundays and after 9 p.m. on weekdays. The company operates buses in addition to the It is believed that buses tranicars. alone will be able to handle traffic during the hours when the tramcars are withdrawn.

Sydney Trams Show Passenger Increase

Passenger revenues of the tramway system of Sydney, New South Wales, increased during the year ended June 30, 1927, from £2,900,406 in 1926 to £3,030,-973 in 1927. Operating expenses were £2,480,587 in 1926 and £2,627,045 in 1927, giving net earnings in 1926 of £419,819 and in 1927 £403,928. greater part of the increase in expenses is due to higher wages, combined with the shortening of the hours of duty from 48 to 44 per week. During the past year, the operating cost per car-mile was 23.83d. (47.66 cents). The book investment is £8,110,571, so that the net earnings show a return on the capital of 5.03 per cent.

The number of passenger fares collected during the year numbered 279,-671,372, an increase of 6,167,489 over the previous year. The rolling stock was increased by 25 cars. The total number of electric cars on June 30, 1927, was 1,541 motor cars and four trailers. The lines are owned and operated by the New South Wales government, which also owns and operates the trunk line railways in New South Wales and the new subway system in Sydney.

Rapid Rise of Barcelona System-Consolidation Ahead

Barcelona's urban transportation has undergone a radical transformation during the last ten years, according to a report to the Department of Commerce from Trade Commissioner James G. Burke, Barcelona. In 1917, with tram lines alone, the income from fares collected in this Spanish city was only 14,000,000 pesetas. At the present time

Bus and Tramway Co-ordination there exist not only tramways but also two subway systems and a bus company. The total income from these three in 1924 amounted to nearly 35,000,000 pesetas, and the total capital invested is now some 107,400,000 pesetas. This increase has been due to the growth in population and traffic, the movement of the inhabitants from the central part of the city to its outskirts, and increased competition resulting in lowering fares and offering better and more frequent

A group of local hankers is carrying on a campaign to combine all subway, tram and bus companies. It is offering the recent combination effected in various European and American cities as an example and is publishing statistics to prove that both better service to the public and municipal economy would be the result.

Tramways Discontinued in Lincoln

Buses will replace tramways in the town of Lincoln, England, because of a continuous falling off in receipts for the last few years, according to a recent announcement. Track construction now necessary would cost £30,000.

Electrification Scheme for Wales

The Swansea & Mumbles Railway, Wales, will soon be electrified at a cost of \$750,000, according to a recent report. The British Electric Traction Company is to provide \$425,000 of this sum.

The line is at present held by the Swansea Improvements & Tramway Company, a subsidiary of the traction company, and the lease is to be trans-ferred to the South Wales Transport Company, another subsidiary. main supply of current will be at the Swansea end of the line, but a transformer substation will be constructed at Blackhill. Each of the cars proposed for use on the line will carry 110 persons and cost £4,000 (\$20,000). The equipment will be overhead and a $7\frac{1}{2}$ minute service is to be provided.

Recent Bus Developments

Last Independent Purchased in Akron

The last independent bus company in Akron, Ohio, the Zeno Transportation Company, has been purchased by Northern Ohio Power & Light Company, and the latter company assumed full control on Jan. 9. The line will continue to operate for 30 days under the present name and will remain an independent company for the time being.

The Zeno Company operated in Akron for seven years. It provided service on South, Sumner, Johnston, Inman and McGraw Streets and operated special buses morning and evening to and from the Goodrich and the Goodyear plants.

Following approval of the City Council, the line will be made a part of the transportation system in Akron with the issuance of transfers between this line and other lines.

The Zenos' had eleven buses, a garage and a filling station. The railway takes over all of this property.

Railway and Bus Men in Oklahoma Co-operate

The Oklahoma Railway, Oklahoma City, Okla., has submitted a proposal to state bus operators for issuance of through tickets on combined interurban, electric and independent bus lines.

P.R.T. Plans More Purchases —Further Ban on Cruising

The Philadelphia Rapid Transit Company, Philadelphia, Pa., applied to the Public Service Commission Jan. 19 for the purchase of the Quaker Cab Company, the only large operator of taxicabs in the city which is not under the control of Mitten Management, Inc. This move follows an announcement made on Jan. 6 by Ralph T. Senter, president of the company, in a letter to Mayor Mackey outlining the policy for 1928. He said that the purchase would make possible the standardization of all taxicab rates in Philadelphia and eliminate duplicate service.

It also sought authorization for acquiring the Montgomery Bus Company, the Doylestown-Easton Motor Company and the Philadelphia Suburban Transit Company. The company's program was defined as contemplating "more unified and efficient transit service in Philadelphia's suburbs."

In connection with cab cruising, night as well as day restrictions to taxi stands was ordered on Jan. 8 by Superintendent of Police Mills of Philadelphia, Pa. The "no cruising" edict against taxicabs was designed to reduce still further the number of empty cabs in the congested section and to increase the service rendered by taxicab companies to the public. It is a revision of the former taxicab rule, as a result of an intensive investiga-

tion of traffic congestion made by the Department of Public Safety.

In the area from Walnut to Arch Streets and the Delaware River to Eighteenth Street inclusive, cabs will be permitted to move from one stand to another as traffic demands, except from 8 a.m. to 6 p.m. when empty cabs will not be permitted to pass an empty stand without orders from a dispatcher or supervisor. The former edict on taxicab cruising in Philadelphia was referred to previously in Electric Railway Journal.

New Bus Service Installed in Kansas City

A system of part-time bus service on East 43d Street was recently installed by the Kansas City Public Service Company, following a meeting of Fred Buffe, vice-president of the company, and the members of the Southeast Improvement Association, which has repeatedly petitioned the company for bus service at this point. An agreement calls for bus service on week days from 6 a.m. to 9:30 a.m. and from 4 p.m. until 7:30 p.m. Saturday night and Sunday night service also will be arranged, Mr. Buffe announced. Officials of the company estimate that 95 per cent of the patrons of the district will be accommodated by the new arrangement. The buses operate at fifteen-minute intervals.

Richmond-Seven Pines Line Denied Permit

Application of the Sandston Railway for authority to operate bus service between Richmond and Seven Pines, Va., via Williamsburg Road, has been dismissed by the Virginia Corporation Commission "without prejudice" by request of the petitioner. Opposition was voiced by the Virginia Electric & Power Company and the Peninsula Transit Corporation. A similar petition was filed by the Sandston Railway about a year ago, but was finally withdrawu.

Regulation for Interstate Carriers

Examiner Flynn presents report on I. C. C. inquiry. The findings and conclusions of his report, however, are merely tentative. Exceptions must be recorded by Feb. 7

PEDERAL regulation of all common carrier motor vehicles operating in interstate or foreign commerce over the public highways was recommended on Jan. 16 by Leo J. Flynn, attorney-examiner for the Interstate Commerce Commission, in a report to the commission based upon an investigation of bus and truck operation throughout the country.

The report covers every phase of motor transportation. It will be argued before the commission on Feb. 10. It recommends that all steam and electric lines now subject to the Interstate Commerce act be authorized by law to engage in motor vehicle service, directly or through subsidiaries, upon obtaining a certificate of convenience and necessity; also that independent motor companies operating in interstate commerce be subject to regulation. Mr. Flynn held that so-called contract carriers "are not sufficiently standardized to make the regulation of such operations in interstate commerce advisable at this time."

The regulation proposed in the report, however, would not include motor vehicles operated by the owners incidentally to the conduct of their business.

It is believed that the record warrants the following conclusions:

l. Transportation of passengers and property by motor vehicles operating over the public highways is a well-established, useful and permanent factor in the nation's transportation system.

2. Steam railroads and electric railways

are engaging more and more extensively, either directly or through subsidiaries, in motor vehicle transportation as supplementary to their rail operations to replace train operations, or as feeders or distributing agencies.

3. Carriers now subject to the act should be authorized by law to engage in motor vehicle service over the public highways, directly or through subsidiaries, upon obtaining a certificate of convenience and necessity as provided in such law.

taining a certificate of convenience and necessity as provided in such law.

4. The revenues, expenses, and investments and other statistics incident to motor vehicle operations by carriers now subject to the act, either directly or through subsidiaries, should be required to be regularly reported to the Commission and be declared by law as coming within the provisions of section 15a of the interstate commerce act in determining net railway operating income under the provisions of that

5. A more detailed classification of accounts adapted to the peculiar problems arising from motor carrier operations by carriers subject to the interstate commerce act, directly or through subsidiaries, should be adopted.

6. Carriers subject to the interstate commerce act and their motor carrier operations should be authorized by law to participate in joint rates and through routes with common carrier motor bus and motor truck lines holding certificates of convenience and necessity from some regulatory body in substantially the same manner as they are now authorized to do with carriers now subject to the act.

7. The problem of regulating motor vehicle operations in interstate commerce is a comparatively new one, and it is too early to attempt regulation by a rigid law. It seems wise, however, to lay down a few principles governing such operations at this time.

8. The law should provide for the regulation of interstate commerce by motor vehicles operated as common carriers of passengers and property over public high-

9. Regulation should not include motor vehicles operated by the owners incidentally

to the conduct of their business.

10. The motor vehicle operations of so-called "contract carriers" are not suffiare not sufficiently standardized to make the regulation of such operations in interstate commerce advisable at this time.

11. Motor carriers operating in interstate commerce as common carriers should be classified: (1) Those operating be-tween fixed termini or over a regular (2) all other common carriers.

route; (2) all other common carriers.

12. Original jurisdiction in the administration of regulation over motor vehicles operating in interstate or foreign commerce as common carriers over the public highways should be vested in such state regulatory bodies as notify the Interstate Commerce Commission that they will act. The Interstate Commerce Commission should be delegated to act with original jurisdiction whenever a State board fails to notify the commission of its acceptance of the delegation of authority to act under the federal statute, and until such notice is received. Joint boards composed of two or more state boards, or representatives of such State boards and of the Interstate Commerce Commission, when acting for a state board, should be authorized to act where the commerce is carried on in two or more states.

RIGHT OF APPEAL RESERVED

· 13. The right of any party to appeal from the action of a state board or a joint board to the Interstate Commerce Com-

mission should be preserved.

14. Legislation for the regulation of motor vehicles operating as common carriers over the public highways should provide as prerequisites to operation: (1) Certificate of convenience and necessity; (2) liability insurance or indemnity bond or satisfactory assurance of financial responsibility which will insure adequate protec-tion for the responsibility assumed in the

transportation of passengers or property.

15. The law should provide that in determining whether or not public conven-ience and necessity require the granting of a certificate to operate, reasonable consideration, among other pertinent matters, should be given to available transportation service by any other existing transportation agency operating in the same territory, and to the effect which the proposed service may have upon any such existing transportation agency, the continued operation of which is important to the community served by it.

16. The law should provide that the fact that an applicant for a certificate of convenience and necessity was in bona fide operation on March 2, 1925, and continuously since then and at the time application is made shall be considered prima facie evidence as to the convenience and

necessity of such operation.

17. Transfer of certificate of convenience and necessity should be permitted with the approval of the issuing board. Revocation of a certificate should only be per-mitted under circumstances of compelling

public necessity.

18. As a condition to the exercise of rights granted with a certificate of convenience and necessity, the holder of the same should be required to undertake to furnish such additional service as the needs of the public might demand in the future.

19. The law should require that rates be just, reasonable, not unjustly discriminatory, and not unduly preferential or unduly prejudicial.

20. Provision should be made for the filing of complaints against rates, practices, or service of motor vehicles operating in interstate commerce over the public highways. The procedure upon hearing of such complaints should be substantially the same as the procedure at hearings upon complaints against steam railroads or electric railways.

Wide Discretion Urged for REGULATORY BOARDS

21. The regulatory boards should be vested with wide discretion in the administration of the law, particularly with respect to rates, fares, and charges, accounting and filing reports; and in the making of rules and regulations for the regulation of motor vehicle operations and service.

22. Broad discretionary powers should be given to the regulatory boards in the matter of exempting interstate motor vehicle operations from any of the provisions of the law if such exemption would be in the public interest, as in the case of small operators who are giving transportation service important to the communities served, but who might be unable to continue operations if required to comply with all regulatory provisions on account of the additional expense involved.

23. Brokerage in transportation of passengers for hire in interstate commerce by motor vehicles operated by a person or company not holding a certificate of convenience and necessity from a regulatory body covering such service should be pro-

24. The issuance, interchange, or exchange of free passes and free transportation by common carrier, motor carriers operating over the public highways in interstate commerce should be prohibited, except in substantially the same manner and to the same extent as provided for in the case of common carriers now subject to the interstate commerce act.

25. Federal legislation for the regulation of commerce by motor vehicles should include the transportation of passengers or property to or from a foreign country, but only so far as such transportation takes place within the United States, in substantially the same manner and to the same extent as interstate commerce.

26. The transportation of explosives and inflammables by motor vehicles in inter-state or foreign commerce is prohibited by the transportation of explosives act, except

and in the manner provided therein.

27. The provisions of the bills of lading act are applicable to motor carriers operating in interstate or foreign commerce.

28. The provisions of the Clayton antitrust act relating to the business and transactions of common carriers are applicable to the business and transactions of motor carriers operating as common carriers in interstate or foreign commerce.

29. Public policy demands the fostering and preserving in full vigor motor vehicle transportation as well as rail and water transportation. Section 500 of transportation act, 1920, should be amended to include motor vehicle transportation in the declaration of policy there made.

There should be a wise, farsighted, and definite co-ordination of all existing transportation agencies-land, water, and air.

The report is a document of 105 mimeographed sheets.

The commission's authority for making the investigation is based upon provisions of the interstate commerce act:

(1) The commission has authority to investigate the manner in which common carriers subject to its jurisdiction are doing business, and (2) the commission is authorized, and in fact is directed, to make such recommendations annually to Congress on matters pertaining to the regulation of interstate commerce as it may deem necessary.

REASONS FOR THE INVESTIGATION

Prior to March 2, 1926, state regulatory bodies generally had assumed, in the absence of any federal legislation on the subject, regulatory control over the operations of motor buses and motor trucks engaged in interstate commerce and interstate operators were required to conform to the laws and regulations of the states in or through which they operated. On that date the Supreme Court of the United States handed down decisions holding that state regulatory bodies could not restrict the operation of buses or trucks engaged in interstate commerce where such regulation was not primarily with a view to safety or to conservation of highways. Buck vs. Kuykendall, 267 U. S. 307; Bush Co. vs. Maloy, 267 U. S. 317. No regulation has been exercised over interstate commerce by buses or trucks not used in terminal service in connection with rail transportation since these decisions were rendered. Several bills providing for the regulation of interstate commerce by buses and trucks operating as common carriers on public highways were introduced at the 69th session of Congress.

Steam railroads and electric railways had entered into the field of motor transportation either directly or through subsidiaries as supplementary to their rail operations; a number of railroads had filed applications with the commission for permission to abandon portions of their lines, alleging as one of the reasons, loss of passenger or freight revenues by reason of motor bus or motor truck competition. The legality and propriety of arrangements under which motor buses or trucks are operated by. or in connection with carriers subject to the interstate commerce act had arisen in formal cases before the Commission and otherwise. Informal complaints had been received from passengers who had engaged transportation for interstate travel by motor vehicle from irresponsible operators who failed to carry out their contracts.

Considering these matters, as well as the rapidly increasing importance of motor transport, the commission on June 15, 1926, entered upon an investigation on its own motion into and concerning the general question of the operation of buses and trucks by, or in connection or competition with, common carriers subject to the interstate commerce act. The scope of the investigation included the legality and propriety of the arrangements under which motor buses and trucks are operated by, or in connection or in competition with carriers subject to the act; the rates, fares, and charges for such services, and the provisions for filing schedules thereof

and the extent to which the traffic and the revenues of the carriers subject to the act are affected by the operation of buses and trucks.

Some Facts About the Electric Railways

Of 260 electric railways subject to the interstate commerce act 118 reported in response to the questionnaire. They operated 401 buses in terminal service and 351 buses in line service with a total bus route mileage in line service of 2,972 miles. Through subsidiaries they operated 190 buses in terminal service and 422 buses in line service over a total line bus route mileage of 2,857 The electric carriers reported that 78 buses were operated by others than themselves or their subsidiaries in terminal service and 315 were operated by others in line service over a bus route mileage of 1,816 miles. With respect to motor buses operated by others in competition with their rail service the electric carriers reported 1,215 vehicles so operated with a total line bus route mileage of 10,280 miles.

The replies of the electric railways indicate that the majority of the buses operated by them or by their subsidiaries were engaged in line or terminal service in competition with their own oper-

ations.

The electric railways reporting operate eight motor trucks in line service over a truck route mileage of 192 miles and 22 trucks in terminal service. In connection with these railways 65 motor trucks were operated by others in line service over a truck route mileage of 829 miles and 27 trucks in terminal service. There were 2,329 motor trucks operated by others in competition over a route mileage of 18,795 miles.

FEWER ELECTRIC RAILWAYS REPORT TO COMMISSION

In 1921 the number of electric railways reporting to the commission was 312. The number decreased each year until in 1926 it was 259. During the same period the railway operating revenues of the electric railways reporting to the commission decreased from \$235,656,072 to \$194,860,000, or 17.31 per cent, and railway operating expenses decreased from \$189,450,749 to \$163,210,222, or 13.85 per cent. The passenger revenue decreased from \$193,166,389 to \$140,-536,857, or 27.25 per cent. It is interesting to note, however, that there was a steady increase in freight revenue during the same period. It was \$28,-585,712 in 1921 and \$39,794,714 in 1926, an increase of 39.21 per cent.

The total revenue passengers decreased from 2,099,721,398 in 1921 to 1,351,235,957 in 1926, or 35.6 per cent; passenger car-miles decreased from 443,013,948 to 373,857,483, or 15.61 per cent.

A number of large electric systems which reported to the commission in 1921 were relieved from doing so in 1926 because of the insignificant amount of their interstate business. On the other hand, a number of large systems which filed no reports in 1921 did file reports in 1926.

Financial and Corporate

Interest to Be Paid by Chicago City Railway

Payment of the semi-annual interest on the first mortgage 5 per cent bonds of the Chicago City Railway and of the Calumet & South Chicago Railway, the south side operating organizations of the Chicago Surface Lines, will be made when it falls due on Feb. 1, according to Frank O. Wetmore, chairman of the bondholders' protective committee. It is expected that semi-annual interest on the first mortgage bonds of the Chicago Railways Company, which operates the north and west side street car lines under a federal receivership, will be ordered paid on Feb. 1 by Judge James H. Wilkerson in the United States District Court, following similar action taken by the court six months

Revaluation Question Up in Tacoma

At the request of the City Council of Tacoma, Wash., Manager Richard T. Sullivan of the Tacoma Railway & Power Company will sound out the stockholders and bondholders of his company on whether they would agree to requesting a revaluation by the state public works department of the company's properties at \$3,000,000, for rate-making purposes, with the understanding that the new valuation would be a consideration for the drafting of a new franchise. The agreement was reached at a recent session with the City Council. This request of the Council means that no attempt will be made to submit a new franchise to the voters at the coming city election, as there is no possibility of the negotiations getting anywhere near finality for weeks or months.

The figure of \$3,000,000 as a valuation of the properties of the railway, and of the Pacific Traction Company, is an arbitrary one, to represent roughly what the report of Kenneth G. Harlan indicated would be a reasonable valuation of properties as they stand today. Mayor Tennant made the motion to request the company to determine the acceptability of such a figure.

The value now recognized by the state department of public works for rate-making is in excess of \$6,700,000, so that the proposed figure is a huge reduction. Manager Sullivan protested that it would put him in an embarrassing position to go to his people with a request for a valuation less than the \$3,500,000 Mr. Harlan suggested as a basis for city purchase. Mr. Harlan replied that his figure had been taken merely as a basis upon which computations might be made, after reducing the company's annual operating expenses by \$300,000, hence in the pres-

ent inquiry, the \$3,500,000 figure did

not apply.

Mayor Melvin G. Tennant took the lead in directing the negotiations towards determining a new valuation. His stand was that, while the agreement between the company and city for an experimental period of operations had avoided the valuation question, when it came to submitting a new franchise, the people would want to know where the valuation matter stood, and that the state was not in a position at any minute to upset the terms of the franchise on the basis of the \$6,700,000 valuation.

New Jersey Board Approves Transfer of Stock

The Board of Public Utility Commissioners of New Jersey on Jan. 14 approved the transfer of all outstanding capital stock of the South Orange & Maplewood Traction Company to the Public Service Corporation of New Jersey. In July, 1901, the South Orange & Maplewood Traction Company absorbed the South Orange & Maplewood Street Railway. The property is leased in perpetuity from Oct. 1, 1903, to the North Jersey Street Railway, now included in the system of the Public Service Railway.

Port Arthur Property Bought by Eastern Texas

At the public auction of the Port Arthur Traction Company, Port Arthur, Tex., the property was purchased by the Eastern Texas Electric Company for \$150,000. The sale was ordered by the United States District Court to satisfy creditors holding \$324,000 in mortgage notes against the company. The creditors petitioned for the sale through the Dayton Trust & Savings Company, Dayton, Ohio.

J. G. Holtzclaw, general manager of the Eastern Texas Electric Company, announced that it is the plan of his firm to replace the rolling stock on the Port Arthur lines with new cars and to replace much old trackage with new rails. The Eastern Texas Electric Company operates the railway of Beaumont and the Beaumont-Port Arthur interurban

line.

Erie Said to Be After Niagara High-Speed Line

Negotiations are reported to be under way for the sale of the Buffalo-Niagara Falls high-speed and the Buffalo, Lockport and Olcott interurban divisions of the International Railway, Buffalo, to the Erie Railroad. The Buffalo-Niagara Falls electric line would give the Erie Railroad a double-track system into Niagara Falls with property along the right-of-way sufficient for adding two more tracks. The Lockport and Olcott interurban division is said to be wanted by the Erie Railroad for the access it would give to the Niagara County fruit belt.

The Buffalo-Niagara Falls high-speed line is one of the most highly developed electric interurban systems in the country. The route covers a distance of 23 miles. The right-of-way from the Buffalo city line is a 66-ft. strip.

Receivers of Oklahoma Railway Discharged

The receivership of the Oklahoma Railway, Oklahoma City, Okla., was officially ended on Jan. 5 by an order issued by John H. Cotteral, federal district judge. The report of George A. Henshaw and G. T. Lackey, receivers, was accepted without protest. The final act was the issuance of an order discharging them and releasing them from bonds.

Niagara Falls with property along the right-of-way sufficient for adding two Kansas City

Dr. P. H. Saunders of Newman, Saunders & Company, fiscal advisers to the Kansas City Public Service Company, arrived in Kansas City recently to become a member of the budget committee of the railway. Dr. Saunders came from New Orleans.

The budget of \$2,578,296 for the completion of the rehabilitation program of 1928 was submitted to Dr. Saunders and his associate members, Powell C. Groner, president of the company, and Col. E. M. Stayton, city representative.

The budget includes \$1,018,180 for overhauling and rebuilding street cars, \$933,228 for new tracks and \$240,588 for special track work at intersections. The committee will report to the directors of the company at a meeting to be held within a few days.

The franchise promised a rehabilitation program of \$6,600,000 to be finished within three years. The expenditures last year were on a scale of more than \$3,000,000.

Bad Year for Detroit Municipal Railway

Gross revenues fell off \$2,000,000 due to industrial depression.

Figures of consulting auditor vary \$1,312,858 from city

statement. Charges to capital differ

FOR the fiscal year ended June 30, 1927, the gross revenues of the Detroit Municipal Railway, Detroit, Mich., fell off more than \$2,000,000. Such is the condition revealed in the annual audit released on Jan. 8 by Price, Waterhouse & Company.

The audit differs from some features of the bookkeeping of the Department of Street Railways, but points out that the net revenue derived from operation during the past fiscal year totaled \$1,912,898. Due to the dissimilarity of methods used in compiling the audit, there is a difference of \$1,312,858 between the figures presented by the auditing firm and those announced by William M. Hauser, auditor for the Department of Street Railways.

Due to unemployment in the early part of 1927, there was a falling off in the number of passengers using the cars and buses. This falling off was greater during the period following July 1, and is not reflected in the audit completed by the independent firm. The audit suggests numerous changes in the methods by Mr. Hauser in keeping D.S.R. accounts, and as his method differs materially from that followed by the auditing company, the figures of the two audits fail to agree in any but a few particulars.

While the net earnings of the system are listed at \$1,912,898, the audit contends that the sinking fund requirements for the year reached \$2,600,227. This latter figure exceeds the earnings by \$687,329, which is compared with a deficiency of \$274,656 for the preceding fiscal year. Mr. Hauser's report shows net earnings as in excess of \$3,000,000,

FOR the fiscal year ended June 30, which would leave an excellent surplies after sinking fund charges had been met.

The discrepancy between the two figures relates largely to depreciation charges, and the question of what is a capital asset. Investments made by the system as capital investments are considered by Price, Waterhouse & Company as properly chargeable to operation expenses. In other instances the depreciation allowed for buses and street cars is not considered sufficient.

In view of conditions in the city during the past year, Del A. Smith, general manager of the system, believes that the department emerged in excellent condition. The independent auditors' report does not take into consideration more than \$500,000 obtained from sale of property in Highland Park, and this sum, with other funds, will be sufficient to meet sinking fund charges, Mr. Smith maintains. The report says:

As a result of our examination, and after taking into account certain adjustments to correct the book figures, including a charge of \$1,172,924 in respect to depreciation and accruing renewals of the properties exclusive of motor coaches and an additional charge of \$113,503, in respect of depreciation of motor coaches, we find that the operations for the year ended June 30, 1927, resulted in net income of \$1,912,896, compared with net income for the year ended June 30, 1926, of \$2,274,165, a decrease of \$361,266.

Sinking fund requirements for the year, viz., \$2,600,227, exceeded the net income available therefor by \$687,329, as compared with a corresponding deficiency for the year ended June 30, 1926, of \$274,656. No appropriation was made from net in-

come for the year ended June 30, 1927, to provide for future repairs and renewals corresponding to the appropriation made from net income for the year ended June 30, 1926, in the amount of \$179,283.

The net income for the year ended June 30, 1927, as set forth in the preceding paragraph, viz., \$1,912,898, is subject to adjustment, due to the fact a number of items have been charged as capital expenditures which, in our opinion, and in accordance with the accounting regulations promulgated by the Interstate Commerce Commission, should in part at least be charged to operating expenses.

The audit then proceeds to itemize expenditures totaling \$879,455 which the public accountants believe should in part be applied to operation costs. The independent auditors say they are not qualified to distinguish these items as representative of renewals, replacements or repairs, but that if so apportioned and charges made to operation rather than to capital expenditures, then the net revenue would be materially reduced. Extraordinary maintenance jobs cost \$545,262.

Gross revenue derived from operation of the system during the fiscal year aggregated \$24,298,054, from which must be deducted operation expenses of \$18,379,659, leaving a net income from operation of \$5,918,394. Taxes paid upon the system totaled \$747,327. After interest and sinking fund charges, depreciation, etc., have been considered the net revenue total was \$1,912,898.

The net revenue claimed by Mr. Hauser in his report was \$3,214,183, leaving a difference between the two accounting reports of \$1,301,284. This latter figure is accounted for as follows by the Price, Waterhouse & Company auditors; depreciation of road and equipment exclusive of motor coaches not provided for in the accounts of the department, \$1,172,924; depreciation on one group of motor coaches not provided for, \$110,235. The two figures total \$1,312,858, after deducting \$11,573 in respect to correction of distribution of income and expenses as between years.

Foreclosure Suit Brought Against Northern Indiana Line

Foreclosure proceedings against the Chicago, South Bend & Northern Indiana Railway were filed on Jan. 8 in the United States District Court at South Bend by the Central Trust Company. New York.

The foreclosure action was brought by the Central Trust Company as trustee for mortgages aggregating \$3,000,000, issued to secure the railway's bonds. The company operates electric interurban lines connecting South Bend, Elkhart and Goshen. South Bend, La Porte and Michigan City, and South Bend, Niles and St. Joseph. Mich., in addition to city service in South Bend and Elkhart and co-ordinated bus service over certain parts of the system.

The line has been in the hands of Raymond R. Smith, former vice-president and general manager, as receiver since last fall.

Personal Items

A. LeRoy Hodges Promoted

Brooklyn City Railroad official made assistant general manager of 230-mile property he has served since 1919

A LEROY HODGES was appointed assistant general manager of the Brooklyn City Railroad, Brooklyn, N.Y., on Jan. 10. Mr. Hodges has been connected with the Brooklyn City property since the termination of its lease to the Brooklyn Rapid Transit Company in October, 1919, by order of the federal court, at the instance of which the Brooklyn City was returned to its owners for operation.

Along with Clinton E. Morgan, vicepresident and general manager of the Brooklyn City Railroad, Roy Hodges,



A. LeRoy Hodges

as he is best known, has carried a large part of the load incident to the rehabilitation and restoration of the Brook-lyn property, a system of 230 miles of lines with more than 1,300 cars operating in a territory which while it has the inspiration killing designation of borough contains almost as many people as Chicago. The lease of the road had run since 1893, so that in addition to the complications of physical rehabilitation with its program for the modernization of the entire rolling stock there was the separation of the personnel and the severance of activities carried on for years for all the Brooklyn roads as a unit. So literally has the court order been followed that at the present time only certain phases of legal work of the Brooklyn City Railroad and the Brooklyn-Manhattan Transit Corporation, the successor to the Brooklyn Rapid Transit Company under reorganization, are handled jointly.

Now this may seem to have little to do with Mr. Hodges and his career, but that is not the fact. It furnishes the background indicative of the task involved in the separation of the systems, in which he has been a factor from the first. To the part that he has played in the work done in Brooklyn

Mr. Hodges brought a wealth of experience both in railway work and in the field of general business. His first railway connection was with the Westchester, Kennett & Wilmington Railway, Kennett Square, Pa., as secretary to the general manager. He left this property in 1908 to enter the employ of the General Electric Company in Schenectady as secretary to the assistant general manager of the switchboard department.

In 1911 Mr. Hodges left Schenectady to become secretary to A. W. Mc-Limont, then vice-president and general manager of the Michigan United Railways, Jackson, Michigan. When this property was leased to the Commonwealth Power, Railway & Light Company in 1912 he was appointed chief clerk to C. E. Morgan, general superintendent of the Michigan Railway, and continued in that capacity, both in Jackson and Grand Rapids, Mich., until he went with the Brooklyn City Railroad in October 1919

road in October, 1919.

Mr. Hodges is a director of the Brooklyn City Railroad, is first vicepresident of the Metropolitan Section of the American Electric Railway Association, and is a member of the Brooklyn Chamber of Commerce and the Kiwanis Club. Of his many accomplishments in the metropolitan district not the least by any means is the work which he has done in behalf of the local section of the American Association. Many men have contributed to make this body a success, but few if any of them have had a bigger part in this work than he or have worked more wholeheartedly in the section's interest. And all the while that he has contributed so unstintingly of his time and energy to this work Mr. Hodges has of course been engrossed in the exacting tasks which have just culminated in his promotion to the office of assistant general man-

ager at Brooklyn.

JOHN F. SCHMUNK, C.P.A., formerly vice-president Mitten Management, in charge of accounting, announces the reopening of his Philadelphia office at 700 Cunard Building, 220 South Sixteenth Street, for the public practice of accounting. For a number of years Mr. Schmunk was senior accountant of the Pennsylvania Public Service Commission, later in public practice with offices both in Harrisburg and Philadelphia. He has practiced before state commissions in some of the most important valuation and rate cases involving public utilities in the states of Pennsylvania and New York. As a member of the subcommittee on bus accounting of the American Electric Railway Accountants' Association he participated in the preparation of the accounting classification for motor carriers promulgated recently by the Pennsylvania Public Service Commission.

J. C. Desautels Promoted in Montreal

J. C. Desautels has been appointed chief claims agent of the Montreal Tramways, Montreal, Que., Canada, effective Jan. 1, 1928. He would appear to be the right man in the right place in the light of his experience in this particular field. Early in his career he served as investigator in the claims department at Montreal and in February, 1926, was promoted to the position of assistant claims agent. During June, 1927, he was acting claims agent.

After completing a scientific and business course, the first position he occupied with the then Montreal Street Railway was as stenographer and office clerk, during the latter part of 1901. He was promoted to the position of clerk and dispatcher for the Cote Division in 1902. During that period he started a private four-year course along lines which would benefit him in his new position. A short time later he



J. C. Desautels

was transferred to a larger division, St. Henry, and held it until 1910. During that time, in company with another employee he devised and composed the street guide for the use of platform men, which guide is still in use. In June of that year he accepted a position of investigator in the claims department. In October, 1922, Mr. Desautels replaced A. J. Gadoua, the latter having been appointed superintendent.

L. J. Harris Assistant to Treasurer at Atlanta

L. J. Harris will become assistant to the treasurer of the Georgia Power Company, Atlanta, Ga. Mr. Harris has been district office manager in the sales department.

During 25 years of service with the company, Mr. Harris has filled many posts of importance. He started as bookkeeper in the railway department when he joined the company in 1902. In 1906, he was made assistant cashier of the company, which post he retained for six years. His next advancement came when he joined the district sales office in 1917 as field representative for

the general sales manager. Subsequently he became manager of the same department and remained in that position until his recent promotion to assistant to the treasurer.

Mr. Harris was educated in Atlanta schools and at Georgia School of Technology. Before he became connected with the local railway he was employed by the Fourth National Bank.

Mr. Harris will be succeeded in the position of district office manager of the sales department by J. M. Billing, who was secretary and treasurer of the Athens Railway & Electric Company until that company was acquired by the Georgia Power Company in February, 1927. Since that time he has acted as auditor of district offices and has been associated with the investment department.

Robert P. Woods Heads Clay County Property

Robert P. Woods vice-president and general manager of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., was made president of that line on Jan. 10. He succeeds in this capacity, A. G. Hoyt, New York. Mr. Hoyt will remain with the line as a director. R. S. Mahan, general superintendent, was named vice-president succeeding Mr. Woods. Francis Mullan, New York, was named assistant secretary-treasurer and R. H. Delafield, New York, was elected chairman of the executive committee.

Mr. Woods became vice-president and general manager of the Kansas City, Clay County & St. Joseph Railway eight years ago. He had been city representative of the Kansas City Railways board of control since 1914. In this work he had had supervision over many of the improvements made by the company. He continued as consulting engineer to the board as he was in a position to direct the carrying out of the extensive traffic improvements which were being made under the direction of John A. Beeler.

Mr. Woods has had a long career in railway activity. In 1901 he was made chief engineer in charge of construction of the Wabash River Traction Line. One year later he was appointed to a absorbed Westinghouse, Church, Kerr similar position with the Indianapolis- 11 & Company, established in 1884, and Shelbyville interurban. From 1902 to 5 nationally known as railroad and indus-1904 he served the Indianapolis & Northwestern Traction Company as chief engineer. Later he was consultant in charge of design and construction of the Lebanon - Thornton Electric Railway, Lebanon, Ind. When the line was completed he was made vice-president and general manager. This position was followed by his becoming president of the company. From 1911 to 1913 he had charge of the building of the 80-mile line of the Kansas City, Clay County & St. Joseph Railway.

Mr. Woods was born in Buffalo, N. Y., in 1870. At the age of 21 he entered engineering work. For the next ten years he was engaged in a number of utility projects.

Dwight P. Robinson Heads New Concern

Engineer of wide experience elected president of United Engineers & Constructors, Inc.

DWIGHT P. ROBINSON, for 35 years engaged in bringing large construction enterprises to completion with speed and economy, has been selected as president to head the United Engineers & Constructors, Inc., organized to merge Dwight P. Robinson & Company, Inc., New York; the U. G. I. Contracting Company, Philadelphia; Public Service Production Company, Newark, N. J., and Day & Zimmer-mann Engineering & Construction Company, Philadelphia, to which reference is made elsewhere in this issue.

With his organization of unusually capable and devoted men, Mr. Robinson, as the first president of the American International Shipbuilding Corporation, developed Hog Island. He resigned from this company in the spring of 1918



D. P. Robinson

and in the fall of that year he organized Dwight P. Robinson & Company, Inc., New York, to conduct an engineering and construction business. One of the first contracts of this company was for the design and construction of the Colfax power station for the Duquesne Light Company, Pittsburgh, planned for an ultimate capacity of 360,000 kw. In 1920, Dwight P. Robinson & Company trial builders.

Mr. Robinson was born in Boston on May 1, 1869. In 1890 he was graduated from Harvard and two years later from the Massachusetts Institute of Technology, where he obtained his electrical engineering education. After graduation, he was an assistant in the mechanical engineering laboratory at the latter institution and in 1893 joined the organization of Stone & Webster. Within a few months he was placed in charge of the Chicago office of that company. From 1895 until 1903 he was engaged in operating light and power properties under Stone & Webster management.

In 1903 Mr. Robinson returned to

Boston in charge of all Stone & Webster engineering, and when the Stone & Webster Engineering Corporation was formed he was made president in charge of both engineering and construction activities. In 1912 he was admitted to partnership. From 1912 to 1918 he had charge of notable hydro-electric developments in Washington, California, Connecticut, Maine, Georgia and Montana, and the building of steam power stations at Seattle, Minneapolis, Boston, Houghton (Mich.), Savannah, Jacksonville, Tampa, Pensacola, Columbus, Dal las, Fort Worth, El Paso, Houston, Port Arthur, Pittsfield, New Bedford and Bridgewater, Mass. and Bridgewater, Mass.

Barney Frauenthal Honored by: St. Louis Railway Club

Whether the recent eulogy of Barney Frauenthal by W. G. Besler, chairman of the board of the Central Railroad of New Jersey, speaking before members of the St. Louis Railway Club, was the real cause, at any rate the member's of that organization have wanted to express their appreciation of the work of their secretary. Accordingly at the nieeting on Dec. 9 Mr. Frauenthal was presented a handsome radio set by the club,: Mr. Hannauer, president of the Boston & Maine, coming all the way from New England to take part in the presentation.

Mr. Frauenthal has served the St. Louis Railway Club from 1906 to 1927. His activities have not been confined to the railroad world alone, as his civic interests have been quite extensive. When the new Union station was built in St. Louis in 1894, he was put in charge of the bureau of information and there provoked much public comment and won praise for his quickness, accuracy and reliable memory. He later became general ticket agent of the Terminal Railroad, in which position he remained until he was made special assistant to the late Benjamin F. Bush, federal director of the Southwestern Region.

Before the termination of "Federal . Operation," Mr. Frauenthal accepted a position with Rolla Wells, receiver of the United Railways of St. Louis, as general traffic agent, which office he holds with the United Railways' successor, the St. Louis Public Service Company.

Probably few men in the city of St. Louis have so wide a circle of friends as Mr. Frauenthal. His acquaintance in the railroad and electric railway world is national.

The St. Louis Railway Club has about 1,000 members.

CLIFFORD J. DELBRIDGE, for seven vears accountant and traveling auditor, cliecking auto transportation operators for the Department of Public Works at Olympia, Wash., has resigned to devote his time to the Portland, Centralia & Cowlitz Valley Truck Line, which he owns.

Manufactures and the Markets

New Officers Elected for Westinghouse Electric

At a meeting of the board of directors of the Westinghouse Electric & Manufacturing Company, held in New York recently, the following officers were elected: Clinton M. Finney, comptroller; Warren H. Jones, secretary; Edward J. Mulligan, assistant secretary.

Mr. Finney comes to the Westing-house organization from the Worthing-ton Pump & Machinery Company, where he held the office of comptroller since 1919 and of vice-president since 1926. Prior to that time he was secretary and treasurer of the Mack Truck companies and treasurer of the George V. Cresson Company. He is a native of Pennsylvania and a graduate of the University of Pennsylvania. In 1926 he was elected president of the National Association of Cost Accountants.

Mr. Jones has held the position of assistant secretary of the Westinghouse Electric & Manufacturing Company since 1911. He was previously secretary to Robert Mather, former chairman of the Westinghouse board. He was born in Amherst, Mass., graduated from the LaGrange, Ill.. High School, and studied law at the Chicago Law School and in the legal department of Winston, Payne & Strawn, Chicago.

Mr. Mulligan after attending the Port Richmond, Staten Island, High School, began his business career as office boy to George Westinghouse 25 years ago. Since that time he has remained continuously in the executive department of the Westinghouse company, rising from one position to another. During recent years he was secretary to James C. Bennett, formerly comptroller and secretary, now vice-president.

Receiver Authorized to Purchase 23 Freight Cars

William A. Carson, receiver for the Evansville & Ohio Valley Railway, Evansville, Ind., operating to Mount Vernon, Grandview and Henderson, Ky., has been authorized by Judge Elmer Q. Lockyear, of the Vanderburgh County Probate Court, to buy 23 freight cars to haul coal and gravel. The receiver stated that this number of cars could be purchased from a Kentucky firm at a reasonable figure.

Ten New Units Arrive for Milwaukee Electric Lines

Genuine leather upholstery and added seating capacity are innovations in the ten new one-man cars recently received by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., from the manufacturer, the St. Louis Car Company, St. Louis. Mention that the

order for these cars had been placed was made in the issue of the JOURNAL for Oct. 15, 1927. Except for minor details they are identical with 50 cars bought a year ago.

The cars, built at a cost of nearly \$14,000 each were scheduled to be placed in service on the State Street line (Route 11) on Sunday, Jan. 15.

The new cars have semi-indirect lighting fixtures, electric heaters, automatic treadle exits, concealed air-control pipes, and latest safety devices. Seating capacity for 55 passengers is provided as well as a reversible, upholstered operator's seat with backrest on each platform in place of a portable stool.

Much of \$200,000 Program for Asheville's Railway

The Carolina Power & Light Company has appropriated \$200,000 for improvements and further extension of its system in Asheville for the year 1928. The full program has not been completed, but extensions of the railway and possible improvements to the present office facilities will be included in the expansion.

With completion of the 1928 building program, the company will have expended approximately \$500,000 in the past three years. More than \$90,000 has been spent in extension of the railway system during the past ten months, while next year quite a large sum will be set aside for the same purpose. The carhouse now under construction in Mud Cut will cost \$150,000.

Construction and Contracting Firms Merge

Dwight P. Robinson & Company, Inc., U.G.I. Contracting Company, Public Service Production Company, Day & Zimmermann Engineering & Construction Company are Brought under the title "United Engineers & Constructors, Inc."

THE merger, under the name of United Engineers & Constructors, Inc., of four important engineering and contracting organizations was announced on Jan. 17, 1928. The companies included are: Dwight P. Robinson & Company, Inc., New York; U.G.I. Contracting Company, Philadelphia; Public Service Production Company, Newark, N. J., and Day & Zimmermann Engineering & Construction Company, Philadelphia.

The new company is launched with contracts in hand amounting to more than \$100,000,000. With the work now under way, including the construction of large dams for the Government on the Ohio River, extensive hydro-electric developments on the Housatonic River in Connecticut, important work in South America and in Spain, and large office and apartment buildings in New York and other cities, United Engineers & Constructors starts business with an unusual program. Dwight P, Robinson has been selected president of the new company. Directors include Mr. Robinson, Arthur W. Thompson, president United Gas Improvement Company, who is chairman of the board of the new company; Thomas N. McCarter, president Public Service Corporation of New Jersey: Samuel T. Bodine, chairman of the board of directors United Gas Improvement Company; Paul Thompson, a vice-president of the United Gas Improvement Company and president of the Philadelphia Gas Works Company; and John E. Zimmermann, president of Day & Zimmermann, Inc.

Details of the financial features of the plan under which the combination was

effected have not been made public but it is understood that an exchange of stock, similar to the proceeding in the acquisition of Day & Zimmermann, Inc., by United Gas Improvement Company is involved.

The new company is singularly well equipped by virtue of wide geographical range of offices to undertake engineering work in many localities. Headquarters will be in Philadelphia but local representation in New York, Newark, N. J., Chicago, Los Angeles, Atlanta, Houston, Pittsburgh, Montreal, Buenos Aires and Rio de Janeiro will be maintained.

Each of the companies involved has a record for successful consummation of large engineering projects with particular relation to the public utility field.

The U.G.I. Contracting Company's operations date back to 1882, when the United Gas Improvement Company was incorporated to engage in engineering and construction. After the United Gas Improvement Company had branched out into the operation and management of utility properties, it continued the contracting business as a construction department. For years the principal work was building and installing Lowe carburetted water gas plants, patents for which were held by United Gas Improvement Company. The operations expanded, taking in the building of coal gas and electric power plants and manufacturing and applying road binders. The U.G.I. Contracting Company was incorporated in April, 1919. It has built and equipped gas and electric plants, office buildings, factories, bridges, piers, tunnels and roads. It has built more than 1,000 carburetted water gas plants.

Recently it acquired the rights to build the German "Stettiner" coal gas ovens in America. Among the steam power plants built by the U.G.I. Contracting Company are the 50,000-kva. Barbadoes Island station, near Norristown, Pa., the 75,000-kva. Devon (Conn.) station, the 37,500-kva. Big Sioux (Sioux City, Ia.) station and the 33,333-kva. station of the Comal Power Company, New Braunfels, Tex. It also built the Stevenson dam and power plant on the Housatonic River in Connecticut and four dams and locks on the Ohio River for the United States government, which form part of the Government's program to make the river navigable at all times. It has under construction extensive hydroelectric developments in Connecticut and Vermont.

Public Service Production Company, a subsidiary of Public Service Corporation of New Jersey, was incorporated on Jan. 27, 1922. It built the \$33,000,-000 Kearny electric station, the Harrison gas works of Public Service, as well as many substations, garages and other buildings, and has erected considerable mileage of high tension lines and has done other work of importance for these organizations. It has also built roads in New Jersey, North Carolina and other states, including the so-called "covered cut," the approach to the Holland vehicular tunnel, has erected several important mills and factories and office huildings, including the eighteen-story Federal Trust Company building, Newark, and has performed many engineering and construction services for public utility, industrial concerns and steam railroads.

Day & Zimmermann Engineering & Construction Company was organized by Day & Zimmermann, Inc., to handle its engineering and construction activities. This firm has a background of more than 25 years of experience in the layout, design and construction of industrial plants, power plants, transmission lines and wide variety of general structures such as hotels, office buildings. warehouses, and port terminal developments. The 220,000-volt transmission lines from Conowingo to the Philadelphia territory are now under construction by this organization. It has been responsible for the design and construction of hydro-electric and steam electric power plants such as the 60,000 kw. (Saxton) station for Penn Central Light and Power Company.

During the war Day & Zimmermann did work for the United States Army, the Navy, the Shipping Board and the Alien Property Custodian. Included among the projects done for Government agencies was the United States Army Supply Base at Philadelphia, comprising the largest piers and warehouses in the port of Philadelphia. For many years Day & Zimmermann have been engaged in the layout and construction of large industrial enterprises such as new plants for the International Harvester Company, American Type Founders Company, Erie Forge & Steel Company, and many others. Institutional work has included such construc-

tion as the new dining hall and extension to buildings at Girard College, Philadelphia. Recently Day & Zimmermann have entered actively the field of hotel and hospital construction. The work of Day & Zimmermann Engineering & Construction Company is entirely separate from the investigation, report and management work which is done by Day & Zimmermann, Inc.

Dwight P. Robinson & Company has been a leader in the construction of large office buildings, hotels and apartment houses in New York, Chicago. Boston, Buffalo and other cities. Activities in addition to building work, include the design and construction of steam power stations, hydro-electric developments, substations, transmission systems, railroad shops, freight terminals, electrification of railroads, locomotive and passenger terminals, coaling stations, sugar refineries, smelters, lead plants, fertilizer plants, lumber mills, tanneries, shops, steel mills, foundries, textile mills, chemical plants, pipe lines and pumping stations, filtration and disposal plants, harbor and dock works.

The company has performed a large volume of work abroad. The principal contracts consist of irrigation projects for the Brazilian Government in northeastern Brazil, the construction of the Embassy of the United States at Rio de Janeiro and of the exhibits buildings during the Brazilian-Centennial Exposition, and the erection of an office building for the Rio de Janeiro Tramway, Light & Power Company, now in progress. In addition, important work is now being undertaken in Argentina.

General Electric Orders for 1927

Orders received by the General Electric Company during the year 1927 amounted to \$309,784,623 compared with \$327,400,207 for 1926, a decrease of 5 per cent, President Gerard Swope has announced.

For the three months ended Dec. 31 orders amounted to \$76,708,532 compared with \$80,406,570 for the final quarter of 1926, also a decrease of 5 per cent.

Sales billed and earnings for the year will be announced the latter part of March, when the annual report of the company is published.

Thirteen Buses in Puget Sound Power Budget

Included in the budget of \$5,000,000 proposed for extension and construction work during 1928 by the Puget Sound Power & Light Company, Seattle, is provision for purchase of thirteen de luxe motor coaches to be put into the stage service during the year. These will be operated by the Pacific Northwest Traction Company, and by the North Coast Transportation Company, subsidiary concerns, both of which maintain offices in the company's Central Terminal building in Seattle.

Versare Bus for Boston Elevated Arrives

The Versare six-wheel bus is being introduced in Boston by the Boston Elevated Railway. The first bus from the Versare Corporation, Albany, N. Y., has arrived and is assigned to a route through the western business section of the city, from the Back Bay district to Bowdoin Square.

Washington Railway New Cars Scheduled for April Delivery

Details of the twelve cars for the Washington Railway & Electric Company, the order for which was mentioned in the Journal for Dec. 17, 1927, have recently been released. The order for the units was placed with the J. G. Brill Company, Philadelphia, Pa. The cars Company, Philadelphia, Pa. will have an over-all length of 42 ft. 3 in., a seating capacity for 49 passengers, and will be of semi-steel construction. The exterior color scheme is to be cream and blue and the interior trim gray enamel and cherry. Four GE-265-A outside-hung motors are specified. Subjoined are the specifications as released by the Washington Railway & Electric Company.

Number of units	2
Type of unitOne-man, motor, passenger, city double-end, double-truck Number of seats	ķ
Number of seats4	9
Builder of car bodyJ. G. Brill Company	,
Date of delivery about	þ
Weight of car body 21,840 lb Weight of truck 18,360 lb Total weight 40,200 lb	•
Weight of truck	٠
Total weight	
Bolster centers 19 ft Length over all 42 ft. 3 in Length over body posts 28 ft. 5 in	
Length over all	
Width over all 8 ft. 5 in Height, rail to trolley base 11 ft. 8 in	i.
Height, rail to trolley base	i.
Window post spacing	ı,
Window post spacing	ì
DoorsEnd, folding	g
Doors End, folding Air brakes Westinghouse with variable load featur	e
Armature bearings	a.
Armature bearings. Plair Axles. A.S.T.M., Specification A-20-2 Car signal system. Faraday high voltage.	1
Compressors	Ä
Compressors Westinginuse 1911-10 Conduit Flexible Control K-35-J, Curtain fixtures. Curtain Supply Company Curtain material Pantasot	e
Control K-35-J.	Ĭ
Curtain fixtures Curtain Supply Company	į
Curtain material Pantasote	e
Destination signs	e
Door mechanism	c
Energy saving deviceArthur power recorde	ŗ
Destination signs. Keyston Door mechanism. National Pneumati Energy saving device. Arthur power recorde Fare boxes. Clevelan	1
Finish. Pain Floor covering. Flexolit Gears and pinions. Tool Steel Gear & Pinion Compan, Glass. Plair Hand brakes Peacock staffles	b
Core and pipions Tool Steel Coar & Pipion Company	v
Glass	'n
Hand brakes Peacock staffles	9
Hand strapsBuffalo type	е
Hand straps Buffalo type II eaters Railway Utility	¥
Headights	25
Headlining Agasote Interior trim Gray enamel and cherry	е
Journal bearings	y D
Journal bearings Bril	î
Lornn fixtures Flectric Service Sunnlies Company.	
Journal boxes Bril Lamp fixtures Electric Service Supplies Company dome type	ė
Motors Four GE-265-A, outside hung	ζ
Painting scheme Cream and blue	е
Roof material	9
Safety car devices. Westinghouse Traction Brake Company Sash fixtures. Curtain Supply Company	
Westinghouse Traction Brake Company	ŗ
Seats	
Seet engoing 294 in	5
Seat spacing 29½ in Seating material Genuine leather Steps. Folding	Ė
Steps Folding	Z
Step treads	3
Step treads. Kase Trolley catchers. Ohio Brass	B
Trolley baseOhio Brass	3
Trolley base. Ohio Brass Trolley base. Ohio Brass Trolley wheels. More-Jones Trucks. Brill 76-E-1 Ventilators. Railway Utility Company Wheels, type. 30-in., chilled iron Wheelsungds. Root	3
Vantilators Pailmay Utility Company	,
Wheels type 30-in chilled iron	
Wheelengerds Root	

Bids for Carhouse at Tacoma to Be Received

The Board of Contracts and Awards, Tacoma, Wash., it was recently reported, would receive bids soon for construction of a carhouse for the municipal belt line. Plans call for a building of frame and timber construction, to be completed within 45 days after signing of contract;

Week in Non-Ferrous Metals Quiet

Consumers of non-ferrous metals appear to be waiting for "something to turn up," judging from the comparatively small volume of sales during the week ended Jan. 18. None of the markets is dead, but the tonnage sold has been below the average. Except for New York lead, prices are quoted a little lower all along the line so far as domestic business is concerned. In London there has been practically no change in price levels, except that tin has declined.

A very sharp distinction can be drawn between the position of the important primary producers of copper and the so-called "custom" sellers. Without exception the former have been quoting 14½ cents, and that they have the courage of their convictions is proved by the fact that not a ton was sold by them. Actual sales in moderate volume were made each day until Jan. 18, during the week, at prices ranging from 14 cents to 14.10 cents, Valley, and at 14.125 cents at Middle West destinations. The preponderant tonnage has been placed at 14 cents. Business in the foreign market has been fair, about 25,000 tons having been sold thus far at the c.i.f. price of 14.50 cents.

The lead market has been disrupted in the week ended Jan. 18 by offerings by a Middle Western dealer at $6\frac{1}{4}$ cents, St. Louis—five points less than any producer had theretofore been willing to sell at. Producers have not been willing to meet this price, though the availability of lead at the lower level has been admitted, and to meet their regular customers halfway a $2\frac{1}{2}$ -point concession has been made from the quotations ruling last week, thus bringing producers' prices to 6.275@6.30 cents. In the East, all sellers continue to

In the East, all sellers continue to quote at the contract price of the American Smelting & Refining Company— $6\frac{1}{2}$ cents, New York, for all deliveries, though lead is said to be available at some other consuming centers in the East at somewhat less than the usual differential from New York prices.

Zinc in fair volume was traded in during the week at 5.625 cents. A few sales for May-June delivery brought 5.65 cents.

London tin dropped below £250 on Jan. 16, and is now lower than for almost three years. Correspondingly low prices have obtained in New York, business having been done as low as 54½ cents on Jan. 17 and 18.

ROLLING STOCK

TORONTO TRANSPORTATION COMMISSION, Toronto, Canada, has accepted delivery on fifteen Mack bus chassis, 233-in. wheelbase, six-cylinder motors, model AL. Bender Body Company is building the bodies.

Public Service Transportation Company, affiliated with the Public Service Railway, Newark, N. J., has ordered five White Model 53 huses, supplementing recent orders for twelve of the same model and ten Model 54.

TRADE NOTES

NATIONAL PNEUMATIC COMPANY.— In the advertisement of this company appearing in the Jan. 7 issue of this paper, instead of the new Springfield, Mass., car, the car of another property was inadvertently shown.

C. Marshall Taylor has been appoointed vice-president and general manager of the Curtin-Howe Corporation, 11 Park Place, New York, which holds the commercial rights to the new wood preservative developed by the engineering laboratories of the Western Union Telegraph Company. Mr. Taylor has been actively engaged in wood preservation since 1906, when he became associated with the International Creosoting & Construction Company, Galveston, Tex., in charge of that company's department of chemistry and tests. He served one year as assistant professor of chemistry at Swarthmore College and then built and operated for fifteen years the Port Reading Creosoting Plant for the Reading Company and the Central Railroad of New Jersey. During that period he was a member and subsequently chairman of the American Railway Engineering Association's committee on wood preservation. He served one term as president of the American Wood Preservers Association and is an affiliate of the American Society of Civil Engineers.

C. N. Thulin, vice-president of the Duff Manufacturing Company of Pittsburgh, has taken over the supervision of the Eastern sales district in addition to the Western sales district of this firm, of which he has been in charge for several years. Mr. Thulin's headquarters will be in New York and Chicago. W. G. Robb has been appointed district manager of the New York district, with headquarters at the company's office, 250 Park Avenue, New York. E. E. Thulin has been appointed district manager of the Chicago district with headquarters in the Peoples Gas Building, Chicago.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 17, 1928

	ŧ		
Metals—New York	**	Paints, Putty and Glass-New You	ork
Copper, slectrolytic, cents per lb. Lead, cents per lb. Nickel, cents per lb. Zinc, cents per lb.	13.788 6.50 35.00 5.975	Lineeed'oil'(5 bbl. lots), cents per lb	10.2 13.25 \$0.65 25-5.50
Tin, Straits, cents per lb. Aluminum, 98 or 99 per cent, cents per lb. Babbit metal, warehouse, cents per lb.: Commercial grade. General service.	54.25 24.30 61.00 31.50	Wire—New York Copper wire, cents per lb Rubber-covered wire, No. 14, per 1,000 ft Weatherproof wire base, cents per lb	15.875 5.30 16.75
Bituminous Coal		Paving Materials	
Frankliu, Ill., screenings, Chicago	1.70 1.55 2.175	Paving stone, granite, 5 in. New York—Grade 1, per thousand \$ Wood block paving 34, 16 lb, treatment.	150
Track Materials-Pittsburgh		N. Y., per aq.yd. Paving brick 31x81x4, N. Y., per 1,000 in	\$2.70
Standard steel rails, gross ton	\$43.00	Paving brick 3x81x4, N. Y., per 1,000 io	51.06
cents per lb. Tis plates (flat type), cents per lb. Angle bars, cents per lb. Rail bolts and nuts, cents per lb. Steel bars, cents per lb. Ties, white oak, Chicago, 6 in.x8 in.x8 ft.	2.80 2.25 2.75 3.90 1.80 \$1.40	carload lots	45.00 1.85 2.05 1.75
Hardware—Pittsburgh		Sand, cu.yd., f.o.b. N. Y	1.00
Wire nails, base per keg Sheet iron (24 gage), cents per lb. Sheet iron galvanized (24 gage), cents per lb. Galvanized barbed wire, cents per lb Galvanized wire, ordinary, cente per lb Waste—New York Waste, wool, cents per lb Waste, cotton (100 lb. bale), cents per lb.: White Colored.		Old Metals—New York and Chi Heavy copper, cents per lb Light copper, cents per lb Light copper, cents per lb Heavy yellow brass, cents per lb Zinc, old scrap, cents per lb Lead, cents per lb, (heavy). Steel car axles, Chicago, net ton. Cast iron car wheels, Chicago, gross ton Ralls (short), Chicago, gross ton Ralls (relaying), Chicago, gross ton (65 lb, and heavier). Machine turnings, Chicago, gross ton.	11.875 10.25 7.375 3.625 5.31 \$16.25 14.25 15.50 28.50 8.00

ADVERTISING LITERATURE

CROUSE-HINDS COMPANY, Syracuse, N. Y., has issued an illustrated mailing folder descriptive of its new Obround condulets, and bulletin 2104 on its "Wedgtite" pipe hangers.

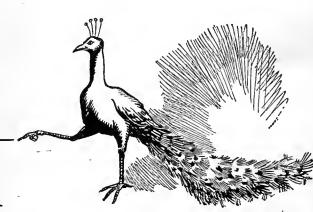
GENERAL ELECTRIC COMPANY, merchandising department, Bridgeport, Conn., has issued a small folder entitled "The Concentrated Arc in Welding."

Ohio Brass Company, Mansfield, Ohio, is mailing an illustrated folder, No. 138H, entitled "Take a Tip" calling attention particularly to its O-B doublearm and pole-top insulator fittings. A return postal card is inclosed with folder on which a request can be made for the company's new booklet 516H.

ALBAUGH - DOVER MANUFACTURING COMPANY, Chicago, Ill., has recently issued bulletin A in the form of an illustrated booklet giving complete information on its speed reducers.

The yardstick of its value is its ability to always take in

all the slack chain



THE capacity of a hand brake to take up ALL the slack that may come in measures its dependability.



Peacock Staffless Brakes are provided with ample space to store all the chain that can possibly come in over the drum. The full braking power will be applied. Peacock Staffless Brakes cannot jam or bind. Write for complete information.

Notion

National Brake Company, Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative Lyman Tube & Supply Company, Limited, Montreal, Canada



The Horseless Carriage of '98 was a success — in '98

Past success is no argument for tomorrow. You know from accumulated experience that the successful policies of yesterday are soon made obsolete by the ever-changing demands of business.

For continued success you must have a dependable source of market information. You must keep abreast of developments in manufacturing methods. You must follow the trend of your field in every particular.

Imperative demand for this information has created the Business Papers, such as the one you are now reading. Their primary function is to gather the news of the industry which they cover and then to select and present that which is important, in such a way as to best serve you.

This paper, a member of the A.B.P., assures you reliable, pertinent news and tested ideas. It is pledged to consider first the interests of the subscriber and to maintain the highest standards of publishing practice. It fulfills this pledge as a requirement of A.B.P. membership.

Paralleling this news service you have the convenience of the business papers "market place." The products of industry truthfully displayed and described are brought to your attention.

This paper can render you an invaluable service. Read it regularly and gain full benefit from the information it carries.

THE ASSOCIATED BUSINESS PAPERS, INC. Executive Offices: 220 West 42nd Street, New York, N. Y.

B Executiv

An association of none but qualified publications reaching the principal fields of trade and industry.



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petti-coat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company Muncie, Ind.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa. Soles Offices:

Chicago

Philedelphia

Claveland Pittsburgh

New York

Pocific Coast Representative:
United States Steel Products Company
Portland San Francisco

Export Representative:
United States Steel Products Company, New York, N. Y.

R. A. HEGEMAN, Jr. President F. T. SARGENT, Secretary

H. A. HEOEMAN, First Vtcs-Pres. and Tress. J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co.

Graybar Building, 420 Lexington Ave., New York

BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass, Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ili.

RAILWAY SUPPLIES

Tool Steel Geara and Pinlone
Anglo-American Varniah Co.,
Varnishes, Enamels, etc.
National Hand Holds
Genesco Paint Oils
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Plowa
Feasible Drop Brake Staffs
Ft. Pitt Spring & Mfg. Co.,
Springs

Flaxlinum Insulation Economy Electric Devices Co.
Power Saving and Inspection
Metera Metera
National Safety Devices Company's Whistle Blowers,
Gong Ringers and Brake
Hangers
Godward Gas Generators
Cowdry Automotive Brake
Testing Machine



JOHNSON FARE COLLECTING **SYSTEMS**



Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 11 to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.





Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.

Bethlehem Products for Electric Railways

Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Fregs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Base Plates; Rolled Steel Wheels and Forged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

SPECIAL TRACKWORK of the famous TISCO MANGANESE STEEL

WM. WHARTON JR. & CO., INC. EASTON, PA.

Boston Chicago El Paso Montreal New York Philadelphia San Franciaco Pittaburgh

ankers @ Engineers

Ford, Bacon & Pavis

Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER

Incorporated

Design and Construction Examinations Reports Appraisals Industrial and Public Service Properties NEW YORK BOSTON. ... CHICAGO

SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design

Construction Reports Examinations

Management Valuations

CHICAGO

NEW YORK

SAN FRANCISCO

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

A. L. DRUM & COMPANY

Consulting and Constructing Engineers VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
COMMISSIONS CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS

230 South Clark Street, Chicago, Ill.

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS

120 BROADWAY, NEW YORK

ENGINEERING CONSTRUCTION

YOUNGSTOWN, O. CHICAGO, ILL.

FINANCING MANAGEMENT

Byllesby Engineering & Management Corporation

231 S. La Salle Street, Chicago

New York

San Francisco

E. H. FAILE & CO.

Designers of

Garages- Service Buildings-Terminals

441 LEXINGTON AVE

NEW YORK

The J. G. White **Engineering Corporation**

Engineers-Constructors

Oll Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys Better Service—Financial Reports Appraisals—Management

52 Vanderbilt Ave.

New York

ENGELHARDT W. HOLST

Consulting Engineers

sisals Reports Rates Service Investigation Studies on Financial and Physical Rehabilitation Reorganization Operation Managemens

683 Atlantic Ave., BOSTON, MASS.

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass-Differential Fares-Ride Selling Holbrook Hall 5-W-3

160 Gramatan Ave., Mt. Vernon, N. Y.

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA .

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING on Management Operation Construction

43 Cedar Street, New York City

C. B. BUCHANAN

W. H. PRICE, JR. Sec'y-Treas.

JOHN F. LAYNG

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction Financial Reports, Traffic Surveys and Equipment Maintenance

BALTIMORE 4 Citizens National Bank Bidg.

Phone: Hanover: 2142

NEW YORK 49 Wall Street

MCCLELLAN & JUNKERSFELD

Incorporated ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations
Transportation Problems—Power Developments

68 Trinity Place, New York Chicago

St. Louis

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES
ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CLEVELAND, Guardian Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street



Bayonne, N. J Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PHOTENIX, ARIZ., Heard Building
PITTSBURGH, FATTMENS DEPOSITE BANK BUILDING
PORTLAND, ORE, Failing Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castie & Cooke Building
HONOLULU, T. A., Castie & Cooke Building
HAVANA, CUBA, Calle de Agular 104
SAN JUAN, PORTO RICO, ROYAL BANK BUILDING

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W. Washington Street, Chicago. Ill.



177707)2043)4043(204))4043)2744714083)4044

THE P. EDWARD WISH SERVICE

Street Railway Inspection DETECTIVES

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



1**000336001300337033700070031**00331037031(0337637003370

Phono-Electric

Contact wire that gives three times the service of hard drawn copper. Hi-strength messenger and guy wires. Write for details.

Bridgeport Brass Co. Bridgeport, Conn.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

.

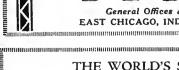
Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc. 101 Park Avenue, New York Olty













We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

The Universal Lubricating Co. Cleveland, Ohio Chicago Representatives: Jameson-Ross Company, Straus Bldg. THE WORLD'S STANDARD

"IRVINGTON"

Varnished Cambric, Varnished Paper Varnished Silk, Irv-O-Slot Insulation Flexible Varnished Tubing

Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co. Irvington, N. J.

Sales Representatives:

\$\text{\tin}\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\te}\tint{\text{\text{\text{\text{\text{\text{\text{\text{\text{\te}\tint{\text{\text{\text{\text{\text{\text{\text{\text{\text{\te}\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\te}\tint{\text{\text{\text{\text{\texi}\text{\text{\texi}\text{\texit{\text{\text{\text{\text{\text{\texi}\text{\text{\texit{\text{

Mitchell-Rand Mfg. Co., N. Y.
E. M. Wolcott, Rochester
I. W. Levine, Montreal
A. L. Gillies, Toronto
Consumers' Rubber Co., Cleveland

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car Collier Inc., Barron G.

Alr Brakes General Electric Co. Westinghouse Air Brake Co.

Anchors, Gay
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Wks.
Elec. Service Supplies Co.

Automatle Return Switch Stands Ramapo Ajax Corp.

Automatic Safety Switch Stands Ramapo Ajax Corp.

Axles Axles
Beunis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Axles, Steel Bethlehem Steel Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Cincinnati Car Co.
Columbia Machine Wks.
Drew Elec. & Mfg. Co.
Westingbouse E. & M. Co.

Bearings, Center and Boiler Side Cincinnati Car Co. S. K. F. Industries Inc. Stucki Co., A.

Bearings, Roller and Ball S. K. F. Industrise, Inc. Timken Roller-Bearing Co.

Bells & Buzzers Consolidated Car Heating Co.

Bells and Gongs
Brill Co.. The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
Elec. Service Supplies Co.

Benders, Rail Railway Trackwork Co.

Bodies, Bas Brill Co., The J. G.

Body Material-Haskellte & Plymetl Haskelite Mfg. Corp.

Boilers Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bouding Co.
Ronde Reil

Una Welding & Bouding Co.
Bands, Rail
American Steel & Wire Co.
Drew Elec. & Mfg. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Trackwork Co.
Una Welding & Banding Co.
Westinghouse E. & M. Co.
Brackets and Cross Arms

Westinghouse E. & M. Co.
Brackets and Cross Arms
(See also Poles, Ties,
Posts, etr.)
Columbin Machine Wks,
Electric Railway Equipment
Co.
Elec, Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Railway Appliance

National Railway Appliance Co. Westinghouse Traction Br

Brake Shoes
American Brake Shoe &
Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Brake Testers
National Railway Appliance Co.

Brakes, Brake Systems and
Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
General Electric Co.
National Brake Co.
Westinghouse Traction
Brake Co. Brake Co.

Brakes, Magnetic Rail Cincinnati Car Co.

Brushes, Carbon General Electric Co. Westinghouse E. & M. Co.

Brushholders Columbia Machine Wks. General Electric Co.

Bulkheads Haskelite Mfg. Corp.

Bus Lighting National Railway Appli-ance Co.

Buses Versave Corp.

Buses, Gas, Electric General Electric Co.

Bushings, Case Hardened and Maogauess Bemis Car Truck Co. Brill Co., The J. G. Cincinnati Car Co. Columhia Machine Wks

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnished General Electric Co. Irvington Varnish & Ins. Co. Mica Insulator Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches Consolidated Car Heating Westinghouse E. & M. Co.

Car Steps, Safety Cincinnati Car Co:

Car Wheels, Rolled Steel Co.

Cars. Damp Brill Co., he J. G. Differential Steel Car Co.

Cars, Gas-Electric Brill Co., The J. G. General Electric Co. Westingbouse Elec. & Mfg.

Cars, Gas, Rail Brill Co., The J. G.

Cars, Passenger, Freight, Ex-Press, Passenger, Freight,
press, etc.
Amer. Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Car Co.

Cars, Self-Propelled Brill Co., The J. G. Cars, Second Hand Electric Equipment Co.

Castings, Brass Composition astings, business or Copper Cincinnati Car Co. Columbia Machine Wks. Eureka Copper Prod. Co.

Castings, Gray Iron and Steel American Steel Foundries Bemis Car Truck Co. Columbia Machine Works & Standard Steel Works Co. Inc. Wm. Wharton, Jr. & Co.,

Castlngs, Malleable & Brass Bemis Car Truck Co. Columbia Machine Wks.

Catchers and Retrievers, Trolley Elec. Service Supplies Co. Ohio Brass Co. Wood Co., Chas. N.

Ceiling Car Haskelite Mfg. Corp.

Cellings, Plywood Panels Haskelite Mfg. Corp. Chairs, Parinr Car Heywood Wakefield Co.

Change Carriers Cleveland Fare Box Co. Electric Service Supplies Co. Change Trays Cincinnati Car Co.

Circuit-Breakers General Electric Co. Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Wks.
Electric Railway Equipment
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows (See also Snow-Plows Sweepers and Brooms) Brill Co., The J. G. Cincinnati Car Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia Machine Wks.
Elec, Service Supplies Co.
Westinghouse E, & M. Co.

Colls. Armature and Field Columbia Machine Wks. General Electric Co. Westinghouse E. & M. Co

Coils. Choke and Kirking Elec. Service Supplies Co. General Electric Co. Westinghouse E. & M. Co.

Coin Changers Il<u>li</u>nois Motive Equipment Johnson Fare Box Co.

Coln Counting Marhines Cleveland Fare Box Co. International Register Co. Johnson Fare Box Co.

Coin Sorting Machines Cleveland Fare Box Co. Johnson Fare Box Co.

Coin Wrappers Cleveland Fare Box Co.

Commutators, Parts General Electric Co.

Commutator Slotters Columbia Machine Wks. Elec. Service Supplies Co. Westinghouse E. & M. Co. Wood Co., Chas. N.

Commutators or Parts Columbia Machine Wks. General Electric Co. Westinghouse E. & M. Co.

Compressors, Alr. Co.
General Electric Co.
Westinghouse Traction Br.
Co.

Condensers Westinghouse E. & M. Co.

Connectors, Solderless Westinghouse E. & M. Co.

Connectors, Trailer Car Columbia Machine Wks, Consolidated Car Heating Co. Elec. Service Supplies Co. Obio Brass Co.

Controllers or Paris Columbia Machine Wks. General Electric Co. Westinghouse E. & M. Co.

Controller Regulators Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co. Converters, Rotary General Electric Co. Westinghouse E. & M. Co. Copper Wire
American Braes Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.
Page Steel & Wire Co.

Copper Wire Instruments
Measuring, Testing and
Recording
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register American Steel & Wire Co. Brill Co., The J. G. Elec. Service Supplies Co. International Register Co. Roebling's Sons Cn., J. A. Samson Cordage Works

Cord Connectors and Couplers Elec. Service Supplies Co. Samson Cordage Works Wood Co., Chas. N.

Couplers, Car American Steel Foundries Brill Co., The J. G. Cincinnati Car Co. Ohio Brass Co. Westinghouse Tr. Br. Co.

Cowi Ventilators Nichols Lintern Co.

Cranes, Hoist and Lift Electric Service Supplies Co. Eureka Copper Prod. Co.

Cross Arms (See Brackets)

Crossing Foundations International Steel Tie Co.

Crossing, Frog and Switch Ramapo Ajax Corp. Wm. Wharton,Jr.& Co., Inc.

Crossing Manganese Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co., Inc. Crossings Wm, Wharton Jr. & Co., Ramapo Ajax Corp.

Crossings, Track (See Track Special Work)

Crossings, Trolley General Electric Co. Ohio Brass Co. Westingbouse E. & M. Co.

Curiains & Curtain Fixtures Brill Co., The J. G. Cutting Apparetus
General Electric Co.
Railway Track Work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Westinghouse E. & M. Co.
Dealer's Machinery & Second
Hand Equipment
Cincinnati St. Ry. Co.
Elec. Equipment Co.
Gerke. J. W.
Salzberg Co., Inc., H. E.
Susquehanna Traction Co.
Van Loan Corp., Irving S.
Destiling, Periode. (See elec.

Derailing Devices (See also Track Work)

Derailing Switches Ramapo Ajax Corp.

Destination Signs Columbia Machine Wks. Electric Service Supplies

Detective Service Wish-Service, P. Edward wish-Service, F. Edward
Door Operating Devices
Brill Co., The J. G.
Cinchnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.,
Tre.

Inc.

Doors and Door Fixtures
Brill Co.. The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
Safety Car Devices Co.

Doors, Folding Vestibale
National Pneumatic Co., Inc.
Prille Track

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Columbia Machine Wks.
Electric Service Supplies
Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders Railway Trackwork Co.

Electrical Wires and Cables Amer. Electrical Works American Steel & Wire Co. Roebling's Sons Co., John

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel Railway Trackwork Co. Una Welding & Bonding Co.

Una Welding & Bonding Co.

Engineers, Consuiting, Contracting and Operating
Beeler, John A.

Buchanan & Layng Corp.
Byllesby Eng. & Man. Corp.
Day & Zimmermann. Inc.

A. L. Drum & Co.
Faile & Co., E. H.
Ford, Bacon & Davis
Hempbill & Wells
Holst, Engelbardt W.
Jackson. Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Engines, Gas, Oll or Steam

Engines, Gas, Oll or Steam Weetinghouse E. & M. Co.

Exterior Side Panels Haskelite Mig. Corp. Fare Boxes Co. Cleveland Fare Box Co. Illinois Motive Equipment

Co.
Johnson Fare Box Co.
Percy Mfg. Co., Inc.
Fare Registers
Electric Service Sup. Co.
Johnson Fare Box Co.

Johnson Fare Box Co.
Fenees, Woven Wire and
Fenre Posts
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co.. The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Star Braes Works
Wood Co., Chas. N.
Fibre and Fibre Tubing
Westinghouse E. & M. Co.
Field Colls (See Colls)

Field Coils (See Colls)

Floodlights
Elec. Service Supplies Co.
General Electric Co. Floor, Sub. Haskelite Mig. Corp.

Flooring, Bus Tuco Products Flooring, Car Tuco Products

Floors Haskelite Mfg. Corp. Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Columbia Machine Works
Eureka Copper Prod. Co.
Standard Steel Works Co.

Frogs & Crossings, Tee Rail Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton,Jr.& Co., Inc.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Funnell Castings Wm. Wharton, Jr. & Co., Inc.

Fuses and Fuse Boxes
Columbia Machine Wks.
Consolidated Car Heating
Co.
General Electric Co.
Westinghouse E. & M. Co.

(Continued on page 28)

EARCHLIGHT

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED-RATE PER WORD:

ositions Wonted, 4 cents a word, minimum 15 cents an insertion, payable in advance. Positions Vacont and all other classifications, 8 cents a word, minimum charge \$2.00, ofs, 40 cents a line an insertion.

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads. Discount of 10 % if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

POSITIONS WANTED

ARMATURE winder, wide experience, desires any kind electric railway work, anywhere. Age 32, PW-78, Electric Railway Journal, 7 So. Dearborn St., Chicago, III.

GENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Rallway Journal, Tenth Ave. at 36th St., New York.

LOOKING FOR WORK? A position wanted advertisement here, outlining your qualifications and experience, will gice you the proper introduction to executives of the Electric Railway Field, seeking men for the kind of position you want.



WANTED

20-K 35 G. or H.H. Controllers

W-75, Electric Railway Journal Tenth Ave. at 36th St., New York City

WANTED

MOTOR CAR

for heavy switching service, cab type, body of steel construction not over 40 ft. in length.

W-76, Electric Railway Journal Guardian Building, Cleveland, O.

FOR SALE

TOK SALE

13.000 kw. Used Rotary Converters
8—1500 kw.—25 cycles
2—500 kw.—25 cycles
with Transformers—Switch Boards, etc.
Price: \$5.00 per kw., in place, Cincinnati,
Ohio.
For further information address

The Cincinnati Street Railway Company Cincinnati, Ohio

FOR SALE

Three Birney Safety One Man Cars, Cincinnati built, Agasote Ceiling, fine condition. Practically re-built each year.

Also one McGuire Cummings Snow Sweeper, long brush type, good as new.

SUSQUEHANNA TRACTION COMPANY Lock Haven, Pa.

FOR SALE

10-G.E. 247-A Motors. 6-K. 28-B Controllers. 20-K. 6 Controllers.

10-Westinghouse 68 and 68-C Motors. J. W. GERKE, 303 5th Ave., N. Y. C.

15 BIRNEY SAFETY CARS

Brill Built

West, 508 or G. E. 264 Motors Cars Complete—Low Price—Fine Condition ELECTRIC EQUIPMENT CO. Commonwealth Bldg., Philadelphia, Pa.

100 STANDARD SINGLE TRUCK, BIRNEY CARS

SPECIFICATIONS

Builder Wason
Length over all
Length Body
Width over all8 ft.
Number seats
Seating capacity32
Type seatsBrill, slat wood
Height from rail to trolley base-9 ft. 91/2 in.
Height car step from rail
Height from step to platform12 iu.

TRUCKS

Type
Size axles
Wheels Steel 26 in, diameter,
3 in, tread, % flauge, 4 ft. 81/2 in. gauge
Journals
Type Journal Box
Wheel Base
Motor Equipment. ?-G.E. 264-G.E. 258-c
2-W.H. 506-A-W.H. 508-A
Gear Ratio
Controllers
Air CompressorsW.H. DH-10-DH-16
GE—CP—27
Weight

SPECIAL BARGAINS!

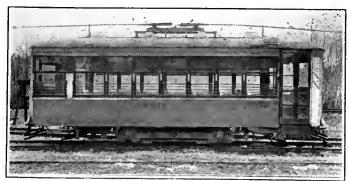
-Double Truck, Medium Welght, All Steel Cars.

-Double Truck, All Steel, Light Weight

Detaited Specifications and Price on Request

Fully Equipped, Ready to Run, No Repairs Needed,

AT YOUR OWN PRICE AND TERMS!



HIS is undoubtedly your first opportunity to discard your antique equipment and replace with modern, all-steel, lightweight equipment, with all known safety devices, without cost to you.

Communicate with us and we will be glad to give you details as to how it can be done.

See our full page ad in the January 14th issue for other equipment offered!

The IRVING S. VAN LOAN CORP., 1819 BROADWAY, N. Y. C.

Telephone: Columbus 4278

Garage Equipment
Columbia Machine Works &
M. I. Co. Westinghouse Tr. Br. Co.

Gas Electric Drive for Ruses & Trucks General Electric Co.

Gas Producers
Westinghouse E. & M. Co. Gates, Car Brill Co., The J. G. Cincinnati Car Co.

Gear Blanks
Bethlehem Steel Co.
Carnegie Steel Co.
Brill Co., The J. G.
Staudard Steel Works Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Philons
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia Machine Wks.
Electric Service Supplies Co. General Electric Co. National Railway Appliance

Co.
R. D. Nuttall Co.
Tool Steel Gear & Pinion
Co.

Generators General Electric Co. Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co. Gongs (See Bells and Gonga)

Grease Texas Company Grinders and Grinding Supplies Railway Trackwork Co.

Grinders, Portable Railway Trackwork Co. Grinders, Portable Electric Railway Trackwork Co.

Grinding Bricks and Wheels Railway Trackwork Co. Ground Wires
Page Steel & Wire Co. Goard Rail Clamps
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.,Inc.

Guard Rails, Tee Rail and Manganese Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.,Inc.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Ohio Brass co.

Ilarps, Trolley
Columbia Machine Works &
M. I. Co.
Elec. Service Supplies Co. General Electric C Ohio Brass Co. R. D. Nuttall Co. Star Brass Worka

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining Columbia Machine Wks. Haskelite Mfg. Corp.

Heaters, Bus Nichols-Lintern Ce. Heaters, Car (Electric) Consolidated Car Heating ing Co.
Gold Car Heating & Light-

Co.
Railway Utility Co.
Railway Utility Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and
Water
Smith Heater Co., Peter

Heaters, Car. Stove Smith Heater Co., Peter Helmets—Welding Railway Trackwork Co. Una Welding & Bonding Co.

Hose, Bridges Ohio Brass Co.

Ohio Brass Co.
Hose. Pneumatic
Westinghouse Traction
Brake Co.
Instruments. Measuring.
Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Railway Appliance Co.

ance Co.
Westinghouse E. & M. Co. Insulating Cloth, Paper and

Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Okonite Co.
Okonite-Callender Cable Co. Inc.
Westinghouse E. & M. Co.
Insulating Silk
Irvington Varnish & Ins. Co. Insulating Varnishes
Irvington Varnish & Ins. Co.

Irvington Varnisn & Ins. Co. Insalation (See also Paints) Dolph Co., John C. Electric Railway Equipment Co. Electric Service Sup. Co. Irvington Varnish & Ins. Co. Mica Insulator Co. Okonite Co. Okonite-Callender Cable Co.

Inc. Westinghouse E. & M. Co. Insulation Slot Irvington Varnish & Ins. Co

Insulator Plus Elec. Service Supplies Co. Hubbard & Co. Ohio Brass Co.

Insulatora (See also Line Material) Electric Railway Equipment

Efectric Rahway Esquipolica Co. Co.
Elec. Service Suppliea Co. General Electric Co.
Hemingray Glass Co.
Hrvington Varnish & Ins. Co.
Ohio Brase Co.
Westinghouse E. & M. Co.

Interior Side Linings Haskelite Mfg. Corp.

Interurban Cars (See Cars Pussenger, Freight Express etc.)

Jacka (See also Cranes, Holsta and Lifta) Columbia Machine Wks, Elec, Service Supplies Co. Oil Jack Co.

Joints, Rail (See Rail Jointa)
Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincionati Car Co.
S. K. F. Iudustries, Inc.

Lamps, Guarda and Fixtures Elec. Service Sup. Co. Weatinghouse E. & M. Co.

Lamps, Arc and Incandescent (See also Headlights) General Electric Co. Westinghouse E. & M. Co.

Lampa, Signal and Marker Eiec. Service Supplies Co. Nichols-Lintern Co.

Lanterns, Classification Nichols-Lintern Co. Heater Boarda
Haskelite Mfg. Corp.
Nichols-Lintern Co.
Cincinnati Car Co.
Lighting Fixtures, Inte

Interior Lightning Protection

Electric Service Sup. Co. General Electric Co. Westinghouse E. & M. Co. Line Material (See also itrackets, Insulators, Wires, etc. Electric Railway Equipment Co.

Electric Service Sup. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes Wm. Wharton, Jr. & Co.,

Locomotives, Electric Cincinnati Car Co. General Electric Co. St. Louis Car Co. Westinghouse E. & M. Co Lubricating Engineers
Universal Lubricating Co.

L"bricants, Oil and Grease Universal Lubricating Co. Manganese Parts Bemis Car Truck Co.

Machinery, Insulating Amer. Insulating Mach. Co. Mauganese Steel Castings Wm. Wharton, Jr. & Co. Inc.

Manganese Steel Guard Rails Ramapo Ajax Corp. Wm. Wharton, Jr. & Co., Inc.

Inc.
Manganese Steel, Special
Truck Warks
Bethlehem Steel Co.
Ramapa Ajax Corp.
Wm. Wharton, Jr. & Co.,

Manganese Steel Switches, Frogs and Crossings Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co., Inc.

Mica Insulator Co. Mirrors, Inside and Outside Cincinnati Car Co. Motor Buses (See Buses) Motors, Generators & Con-trols for Gas Electric Buses General Electric Co. Motors, Electric General Electric Co. Weatinghouse E. & M. Co.

Motorman'a Seats
Brill Co., The J. G.
Cincinnati Car Co.
Electric Service Sup. Co.
Hale-Kilburn Co.
Heywood Wakefield Co.
Wood Co. Cheen N. Wood Co., Chas. N

Nuts and Bolts Bemis Car Truck Co. Bethlehem Steel Co. Cincinnati Car Co. Hubbard & Co.

Omnibusea (See Buses) Ovens Young Brothers Oxy-Acetylene (See Cutting Apparatus)

Parking Westinghouse Traction Brake Co.

Paints and Varnishes (Insuiating)
Dolph Co., John C.
Electric Service Sup. Co.
Irvington Varnish & Ins.

Mica Insulator Co. Painta & Varnishes, Railway National Ry. Appliance Co. Panels, Outside, Inside Haskelite Mig. Corp. Pickups, Trolley Wire Draw Elec. & Mig. Co. Elec. Service Supplies Co. Ohio Brass Co.

Pinion Pollers
Drew Elec. & Mfg. Co.
Elec. Service Supplies Co.
Wood Co., Chas. N.
Pinions (See Gears)

Pins, Case Hardened, Wood and Iron Bemis Car Truck Co. Ohio Brass Co. Westinghouse Tr. Brake Co.

Pipe Fittings
Standard Steel Works Co.
Westinghouse Tr. Brake Co.
Planers (See Machine Tools) Plates for Tee Rail Switches Ramapo Ajax Corp.

Hamapo Ajax Corp.
Pilers, Rubber Insulated
Electric Service Sup. Co.
Plywood (Roofs, Headlining
Floors, Inferior Panels,
Bulkheads, Truss Planks)
Haskelite Mfg. Corp.
Pneomatic Tools
Ingersoll-Rand Co.
Pole Line Headware

Ingersoll-Rand Co.

Pole Line Hardware
Bethlehem Steel Co.
Ellectric Service Sup. Co.
General Electric Co.
Ohio Brass Co.

Poles, Metal Street
Bates Steel Co., Walter
Electric Rallway Equipment
Co.

Hubbard & Co. Union Metal Mfg. Co. Pole Reinforcing Hubbard & Co.

Poles, Tles, Posts, Piling and Lumber Bell Lumber Co. Naugle Pole & Tie Co. J. F. Prettyman & Son Pnles & Ties, Treated Bell Lumber Co.

Peles, Trolley
Bell Lumber Co.
Electric Service Sup. Co.
R. D. Nuttall Co.

Polea, Tuhular Steel Electric Railway Equipment Electric Service Sup. Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co.

Power Saving Devices National Railway Appliance

National Railway Appliance
Co.

Pressings, Special Steel
Cincinnati Car Co.

Pressure Regulatora
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Traction
Brake Co.

Ponches, Ticket
International Register Co.
Wood Co., Chas. N.

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)
Rail Jointa

Rail Jointa Rail Joint Co., The

Rail Joints-Welded Lorain Steel Co. Rails, Steel Bethlehem Steel Co. Rail Filler Carey Co., The, Philip

Rall Welding Railway Trackwork Cn. Una Welding & Bonding Co. Rallway Safety Swirrhes
Consolidated Car Heating Co
Westinghouse E. & M. Co.

Rattan Brill Co., The J. G. Electric Service Sup. Co. Hale-Kilburn Co. Halle-Kilburn Co. Rattan, Car Seat, Webbing Heywood Wakefield Co Registers and Fittings Brill Co. The J. G. Clneinnati Car Co. Electric Service Sup. Co. International Register Co. Reinforcement, Concrete Amer, Steel & Wire Co. Bethlehem Steel Co. Carnegie Steel Co.

Repair Shop Appliances (See also Coll Bunding and Winding Machines) Elec. Service Supplies Co.

Repair Work (See also Coils)
Westinghouse E. & M. Co. Replacers, Car Cincinnati Car Co. Electric Service Sup. Co.

Electric Service Sup. So.
Resistances
Consolidated Car Heating Co
General Electric Co.
Resistance, Wire and Tube
American Steel & Wira Co.
Westinghouse E. & M. Co.
Retrievers, Trolley (See
Catchers and Retrievers,
Trolley)
Bheostats

Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

Rnofing, Car Haskelite Mfg. Corp. Roofs, Car & Bua Haskelite Mfg. Corp.

Sanders, Track.
Brill Co., The J. G.
O. M. Edwards Co., Inc.
Electric Service Sup. Co.
Nichols-Lintera Co.
Ohio Brass Co.

Sash Fixtures, Car Brill Co., The J. G. Cincinnati Car Co. Sash, Metal. Car Window Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track) Screw Drivers, Rubber

Insufated Electric Service Sup. Co. Seating Materials
Brill Co., The J. G.
Hale-Kilburn Co.
Haskelite Mfg. Corp.
Hcywood Wakefield Co

Seata, Bus
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood Wakefield Co Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
Heywood Wakefield Co

Second Hand Equipment Cincinnati St. Ry. Co. Electric Equipment Co. Gerke, J. W. Salzberg Co., Inc., H. E. Susquehanna Traction Co. Van Loan Corp., Irving S.

Shades, Vestibule Brill Co., The J. G. Cincinnati Car Co.

Shovela Brill Co., The J. G. Hubbard & Co. Shovels, Power Brill Co., The J. G.

Side Bearings (See Bearing Center and Side) Signals, Car Starling Consolidated Car Heating Co Electric Service Sup. Co. National Pneumatic Co..

Signals, Indicating
Nichols-Lintern Co.
Signal Systema, Block
Electric Service Sup. Co.
Nachod & U. S. Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Creasing Nachod & U. S. Signal Co. Slack Adjusters (See Brake Adjusters)

Siag Carnegie Steel Co. Carnegie Steel Co.
Sleet Wheels and Cutters
Columbia Machine Wka.
Cincinnati Car Co.
Electric Railway Equipment Electric Service Supplies Co. R. D. Nuttail Co.

Smokestacks, Car Nichola-Lintern Co. Snow Plows National Railway Appliance Co. Snow-Piows, Sweepers and

Brooms
Brill Co., J. G.
Columbia Machine Wks.
Consolidated Car Fender Co. Snow Sweeper, Rattan Brill Co., J. G. Heywood Wakefield Co.

Heywood Wakefield Co.
Soldering and Brazing Apparatus (See Welding Proceases and Apparatus)
Special Adhesive Papers
Irvington Varnish & Ins. Co.
Special Trackworl:
Bethlehem Steel Co.
Wm. Wharten, Jr. & Co., Inc.
Lorain Steel Co.
Spikes

Spikea American Steel & Wire Co. Splicing Compounda Westinghouse E. & M. Co.

Spliring Sleeves (See Clamps and Copnectora)

Springa National Railway Appli-National Railway Appliance Co.
Springs, Car and Trork
American Spiral Spring Co.
American Steel Foundries
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.
Sprinklers, Track and Read
Brill Co., The J. G.
Steel and Steel Products
American Steel & Wire Co.
Steps, Car

Steps, Car Brill Co., The J. G. Cincinnati Car Co.

Stokers, Mechanical Babcock & Wilcox Co. Westinghouse E. & M. Co.

Westinghouse E. & M. Co.
Ston Signals
Nichola-Lintern Co.
Storage Batterles (See Ratterles, Storage)
Strain, Insulators
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand

American Steel & Wire Co. Roeblings Sons Co., J. A. Street Cara (See Cars, Pas-aenger, Freight, Express, etc.)

Superheaters Babcock & Wilcox Co. Sweepers, Snow (See Snow Plows, Sweepera and Brooma)

Switch Standa and Fixtures Ramapo Ajax Corp. Switches General Electric Co. Switches, Selector Nichels-Lintern Co.

Switches and Switchhoards Consolidated Car Heating

Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co.
Switches, Tee Rail
Ramapo Ajax Corp.
Switches, Track (See Trark
Special Work)

Tampers, Tie Railway Trackwork Co. Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tape)
Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
Telephones and Parts
Electric Service Sup. Co.

Telephone & Telegraph Wire American Steel & Wire Co. J. A. Roeblings Sons Co. Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co. Peter
Tirket Choppers & Destroyers
Electric Service Sup. Co.

Ties and Tie Rods, Steel International Steel Tie Co.

Ties, Wood Cross (See Poles Ties, Posts, etc.) Tokens Johnson Fare Box Co. Tongue Switches Wm. Wharton, Jr. & Co., Inc.

(Continued on page 30)

"The Standard for Rubber Insulation"

INSULATED WIRES and CABLES

"Okonite," "Manson," and Dundee "A" "B" Tapes

Send for Handbook

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories, PASSAIC, N. J.

PATERSON, N. J.

Offices: New York Chicago Pittsburgh St. Louis Atlanta Birmingham San Francisco Los Angeles Seattle Pettingell-Andrewe Co., Boston, Macs.

F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Phila., Pa. m. Rep.: Engineering Materials Limited, Montreal



INDUSTRIAL GASES

Cubon Rep.: Victor G. Mandoze Cn., Havana,

ACETYLENE **OXYGEN**



HYDROGEN NITROGEN

Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.

International Oxygen Co., Main Offices: Newark, N. J. Pittsburgh

Repetition

is Reputation

GOLD CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

ELECTRIC HEATERS WITH OPEN COIL OR ENCLOSED ELEMENTS THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE





Railroad Cross-ties; Switch-ties; Bridge Timbers; Construction Timbers; Mine Timbers, Lumber; Piling; Poles; Posts and other Forest Products

F.Prettyman & Sons rood Preserving Plant Charleston. S.C.

Arc Weld Rail Bonds

Descriptive Catalogue Furnished

American Steel & Wire Company

CHICAGO, NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADEL-PHIA, PITTSBURGH, BUFFALO, DETROIT, CINCINNATI BALTIMORE, WILKES-BARRE, ST LOUIS, KANSAS CITY, ST, PAUL, OKLAHOMA CITY, BIRMINOHAM, MEMPHIS, DALLAS, ATLANTA, DEDVER, SALT LAKE CITY EXPORT REPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK PACIFIC COAST REPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LOS ANGELES, PORTLAND, SEATTLE.



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 20-32 West Bendolph Street. Cincinnetl, Trection Bldg.: New York, 100 E. 42nd 8s.

Chapman Automatic Signals

Charles N. Wood Co., Boston





Rod, Wire and Cable Products

NACONDA ANACONDA COPPER MINING COMPANY

NACONDA TROLLEY WIRE

CEDAR POLES

BUTT TREATING ALL GRADES

BELL LUMBER CO., Minneapolis, Minn



of extra quality stock firmly braided and smoothly finished Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS. .

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page A	Page E	Page L	Page Searchlight Section 25
American Brass Co., The 29	Electric Equipment Co 25		S K F Industries IncInsert 10t
American Car Co.,	Electric Railway Equipment Co. 24	Lorain Steel Co., The 21	Smith Heater Co., Peter 27
Third Cover, Insert 10v	Electric Service Supplies Co 7	M	Standard Steel Works Co 10
American Electrical Works 29			Star Brass Works 24
American Insulating Mach. Co., 27	F	McClellan & Junkersfeld 42	Steubenville, East Liverpool &
American Steel & Wire Co 29	Faile & Co., E. H	Mica Insulator CoInsert 122b	Beaver Valley Traction Co 55
American Steel Foundries 6	Ford, Bacon & Davis, Inc		Stevens & Wood, Iac 22
American Spiral Spring Mig. Co.,	"For Sale" Ads	N	Stone & Webster 22
Insert 122b	201 0410 1240	Nachod and United States Signal	Stucki Co., A
Anaconda Copper Mining Co 29	0	Co., Inc 27	Susquehanna Traction Co 25
	•	National Brake Co., Inc 19	
В	General Electric Co	National Pneumatic Co.,	T
	Gerke, J. W 25	11, lnsert 10s	
Babcock & Wilcox Co 23	Gold Car Heating & Ltg. Co 29	National Railway Appliance Co. 21	Tuco ProductsInsert 10r
Bates Exp. Steel Truss Co 23		Naugle Pole & Tic Co 29	
Beeler Organization, The 22	н	Nichols-Lintern Co., The 27	U
Bell Lumber Co	Hale & Kilburn Co	Nuttall Co., R. D 8	
Bemis Car Truck Co 27	Haskelite Mfg. CorpBaek Cover	_	Una Welding & Bonding Co 23
Bridgeport Brass Co	"Help Wanted" Ads	0	Universal Lubricating Cc 23
Brill Co., The J. G.,	Hemingway Glass Co	Ohio Brass Co 5	
Third Cover, Insert 10v	Hemphill & Wells 22	Okonite-Callender Cable Co., Inc.,	. v
Buchanan & Layng Corporation. 22	Heywood-Wakefield Co 17	The 29	
Byllesby Eng. Man. Corp 22	Holst Englebardt W 22	Okonite Co., The	Van Loan Corp., Irving S 25
- Julio of Light Italia Colpitation AL	Hubbard & Co		Versare CorpInsert 10a to 10p.
,		P	
C	T	Perey Mfg. Co., Inc 23	/w
Carey Co., The Philip 14	_	Positions Wanted and Vacant 25	**
Chillingworth Mfg. Co 27	Illinois Motive Equipment Co 27	Prettyman & Sons, J. F	"Want" Ads 25
Cincinnati Car Co12-13	International Oxygen Co 29	Page Steel & Wire Co.,	Wason Mig. Co.,
Cincinnati St. Ry. Co 25	International Register Co 24	Insert 122b	Third Cover, Insert 10q
Cleveland Fare Box Co., The 27	International Steel Tie Co.,		Westinghouse Electric & Mfg. Co.,
Collier, Inc., Barron G 16	Front Cover	R	Third Cover, Insert 100q
Columbia Machine Wks. &	Irvington Varnish & Insulator		Westinghouse Traction Brake Co
M. I. Co	Co 23	Rsil Joint Co., The 27	9, Insert 10u
Consolidated Car Fender Co.,	_	Railway Track-work Co 4	Wharton, Jr. & Co., Wm 21
The 27	J	Railway Utility Co	"What and Where to Buy",
Consolidated Car Heating Co 23	Jackson, Walter 22	Ramapo-Ajax Co	26-28-30
	Johnson Fare Box Co 21	Richey, Albert S	White Engineering Corp., J. G 22
D		Webling's Sods Co., John A 25	Wish Service, The P. Edw 21
Day 4 8'	K	8	Wood Co., Chas. N 29
Day & Zimmermann, Inc 22		•	
Differential Steel Car Co., The. 24	Kelker, DeLeuw & Co 23	Salzburg Co., Inc., H. E 25	y
Dolph Co., The John C 15 Drum & Co., A. L 22	Kuhlman Car Co.,	Samson Cordage Works 29	
	Third Cover, Insert 10v	Sanderson & Porter 22	Young BrosInsert 122a

WHAT AND WHERE TO BUY—Continued from page 28

Tool Steel Bethlehem Steel Co. Carnegie Steel Co.

Tools, Track & Miscellaneous Amer. Steel & Wire Co. Columbia Machine Wks. Electric Service Sup. Co. Hubbard & Co. Rallway Trackwork Co.

Torches, Arctylene (See Cutilng Apparatus)

Towers and Transmission Structures Bates Exp. Steel Corp. Westinghouse E. & M. Co.

Track Expansion Joints
Wm. Wharton, Jr & Co.,
Inc.

Track Grinders
Railway Trackwork Co.
Ramapo Ajax Corp.
Una Welding & Bonding Co.

Track, Special Work
Bethlchem Steel Co.
Columbia Machine Wks.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.,
Inc.

Trackless Trnlley Cars Brill Co., The J. G.

Transfers (See Tickets)

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Treads Safety Stair Car Step Cincinnati Car Co.

Tree, Wire Okonits Cc. Okonite-Callender Cable Co.

Trolley Bases
R. D. Nuttall Co.
Ohio Brass Co.

Trolley Bases, Retrieving R. D. Nuttall Co. Ohio Brass Co.

Ohio Brass Co.

Frolley Buses Brill Co., The J. G. Westinghouse E. & M. Co.

Trolley Material (Overhead)
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Wheel Bushings Star Brass Works

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
American Brass Co.
Amer. Electrical Works
American Steel Foundries
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
Page Steel & Wire Co.
Roceblings Sons Co., J. A.

Trucks, Car Bemis Car Truck Co. Brill Co., The J. G. Cincinnati Car Co.

Truss Planks Haskelite Mfg. Corp.

Tubing, Yellow and Black Flexible Varulsh Irvington Varnish & Ins. Co.

Turbine, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Electric Service Sup. Co.
Perey Mfg. Co., Inc.

Turntables Electric Service Supplies Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers and Silks Irvington Varnish & Ins. Co.

Ventilators National Ry. Appliance Co.

Ventilators, Car Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Heating Co. Nichols-Lintern Co. Railway Utility Co.

Vestibule Linings Haskelits Mfg. Corp. Welded Rail Joints Lorain Steel Co.. The Railway Trackwork Co. Una Welding & Bonding Co.

Welders, Portable Electric General Electric Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Welders, Rall Joint General Electric Co. Ohio Brass Co. Railway Trackwork Co.

Welding Processes and Apparatus Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Welding Steel Railway Trackwork Co. Una Welding & Bonding Co.

Welding Wire American Steel & Wire Co. Railway Trackwork Co. Roebling's Sons Co., J. A.

Welding Wire and Rods Page Steel & Wire Co. Railway Trackwork Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools) Wheels, Car Steel & Steel Tire American Steel Foundries Bemis Car Truck Co. Standard Steel Works Co.

Co.
Electric Service Supplies Co.
R. D. Nuttall Co.
Ohio Brass Co.
Star Brass Works

Whistles, Air Ohio Brass Co. Westinghouse E. & M. Co. Westinghouse Traction Braks Co.

Window Guards & Fittings Cincinnati Car Co.

Wire, Copper Covered Steel Page Steel & Wire Co.

Wire Rope Amer. Steel & Wire Co. Roebling's Sons Co., J. A.

Wires and Cables
American Brass Co,
Amer. Electrical Works
Amer. Steel & Wire Co,
Anaconda Copper Min. Co.
Bridgeport Brass Co,
General Electric Co,
Okonite Co,
Okonite Co,
Okonite Callender Cabls Co.
Page Steel & Wire Co,
Roebling's Sons Co, J. A.
Westinghouse E. & M. Co.





Brill No. 277-EX Trucks under "The Car for 1928"

A Real Advance in Brake Design

As a means of reducing annoying brake noises to meet the demand of "the Car for 1928" Brill engineers developed a novel external contracting shoe type drum brake.

There is a wide drum pressed on each axle, located diagonally across the truck. A separate air brake cylinder, directly connected to the actual pressure-applying levers, is located adjacent to each drum, thus eliminating many rigging parts and any noise or loss of effectiveness of brake application to which they might contribute. Also with this drum type brake the possibility of water, slush and grit

interfering with the brake efficiency is reduced.

The external contracting or "clasp" type brake minimizes wear on journal boxes and sideframes, as well as eliminating rolling or shifting of journals upon brake application. It also facilitates free movement of journal springs and permits their functioning to better advantage.

The drum type brake is one of the outstanding improvements of the Brill No. 277-EX Truck upon which the Brill 1928 Model Car is mounted.





HASKELITE



in the new cars at Atlanta, Georgia

HASKELITE for headlining and interior trim was specified in the 40 cars recently built by the Cincinnati Car Company for the Georgia Power Company for service in Atlanta.

This is not an experiment with this company. HASKELITE headlinings were installed in the cars built in 1925 and this material has also been applied in two later orders for other applications.

The constantly growing list of leading properties on which HASKELITE or PLYMETL is used is conclusive evidence of their lasting satisfaction. More than 50 companies have

applied these structural plywood panels in street cars during 1927. Still others have used them in bus construction.

The common uses include

roofs, floors, side panels, headlinings and interior trim. A completely-equipped car will show a saving in weight of more than 900 lbs., producing an operating economy that should compel attention from any electric railway executive. May we send you facts regarding the light weight and great strength of HASKELITE and PLYMETL, to show you how others use them and some of the operating results achieved?

HASKELITE MANUFACTURING CORP.

133 West Washington Street, Chicago

Railway Representatives:

Economy Electric Devices Co., 37 W. Van Buren St., Chicago Grayson Bros., 600 LaSalle Bldg., St. Louis, Mo. Railway & Power Engineering

Railway & Power Engineering Corp., Toronto, Ont., Canada



ELECTRIC RAILWAY JOURNAL

Graw-Hill Publishing Company, Inc.

JANUARY 28, 1928

Twenty Cents per Copy

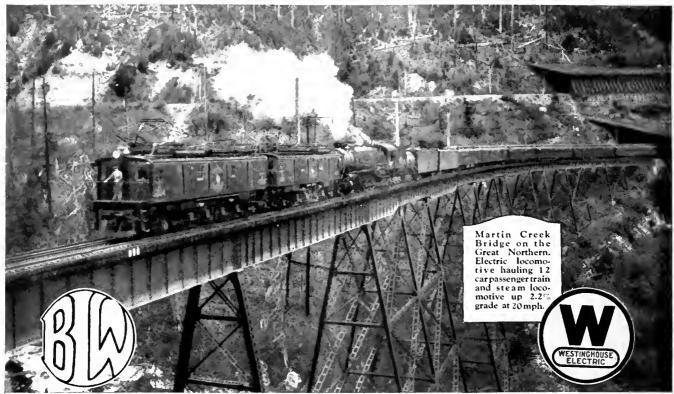


ALMOST every maker of buses in America has widely adopted Timken Bearings. Many of the greatest European bus manufacturers are Timken users. Transcontinental trains, suburban trains and self-propelled cars are running on Timken Bearings. And trolley companies are going to Timkens.

The combination of anti-friction operating economies with highest endurance—the result of Timken tapered construction, Timken POSITIVELY ALIGNED ROLLS and Timken electric steel—is what makes Timken Bearings inevitable for all modern transportation.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN Tapered BEARINGS



Building an Empire

IT required faith—sustained confidence in the growing prosperity of our country—to blaze a trail across the nation. The Great Northern Railroad is a lasting monument to the vision of these intrepid pioneers.

Competitive conditions are making farsighted, progressive management of equally great, if not greater importance today. In this the Great Northern took the initiative. The electrified section extending from Skyhomish, Washington, through the present Cascade Tunnel is eloquent evidence of this pioneering instinct. With the completion of a new eight-mile tunnel which will shorten the present route by seven and one-half miles, the electrified zone will cover nearly 100 miles. Baldwin-Westinghouse electric locomotives will operate on this new extension.

The Baldwin Locomotive Works
Philadelphia Pennsylvania

Twenty-one of the twenty-six miles already electrified are on a 2.2% grade. With steam motive power the speed on this grade was seven miles an hour. Electrification has made possible operation at more than twice this speed and the handling of larger tonnage trains. Freight and passenger trains, therefore, are moved with greater ease and dispatch and operating costs are reduced proportionately.

Another outstanding achievement is the fact that the world's most powerful motor-generator locomotive, capable of hauling 200-car trains operate on this road. These new giants, which were built by Baldwin-Westinghouse, can exert 7,000 hp. under maximum conditions and have a continuous rating of more than 3500 horsepower. Having transformers and motor-generators as part of the equipment, they utilize high voltage a-c. current on the trolley to drive d-c. traction motors, thus providing the outstanding advantages incident to a high-voltage trolley supply coupled with direct current motor drive.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania



MORRIS BUCK Managing Editor JOHN A. MILLER, JR. Associate Editor CLARENCE W. SQUIER Associate Editor G. W. JAMES, JR. Assistant Editor

BURGIRIG IRANICA

CHARLES GORDON, Editor

HENRY W. BLAKE Senior Editor GEORGE J. MACMURRAY News Editor PAUL WOOTON Washington Correspondent ALEX McCALLUM Editorial Representative London, England

Vol. 71 No. 4

CONTENTS

Pages 145-184

IANUARY 28, 1928

Editorials145
Judges Award Safety Prizes
Safety a Science at Louisville
Double-Reduction Motor Drive with Spring Suspension
Philadelphia Tackles Its Street Congestion Problem 155 Extensive publicity campaign carried on by Philadelphia Rapid Transit Company during November and December brought public appreciation of the real causes of traffic congestion and consequent delays. Elimination of taxi cruising a major accomplishment.
Flat Car-Trailer Equipment Successful on South Shore Line
Electric Railways to Climb the Pyrenees158
Third Avenue System Prepares for Bus Service in New York
Good Service Can Be Given at Low Cost
Maintenance Methods and Devices162Handy Sash Painting Stand162Salt and Sand Spreader162Convenient Cabinet for Drills162Support for Car Ends in Overhaul Shop163
New Equipment Available
Association Activities
American Association News
News of the Industry
Recent Bus Developments
Financial and Corporate
Personal Mention
Manufactures and the Markets

It Has Got to Come

THERE must be stricter and stricter regulation of motor vehicles using the public streets. They are defeating their own very purpose. So the P.R.T. experiment, reviewed elsewhere in this issue, and the enforcement of the Chicago no-parking ordinance in the Loop District, which will be the subject of an article in a forthcoming issue, are attracting much attention. The fact that the United Railways, Baltimore, has sent one of its engineers to Chicago to study the matter at first hand, and that placards are appearing in the surface cars in New York stressing the improvement in transportation that has accrued through the enforcement of the Chicago ordinance are just isolated instances of the interest in the matter. The efforts of Philadelphia and Chicago hold forth promise for the future. For those who can not go to either of these cities to see for themselves the JOURNAL as usual is supplying the facts.

McGRAW-HILL PUBLISHING COMPANY, INC. Tenth Avenue at 36th Street, New York, N. Y.

New York District Office, 285 Medison Ave. Cable Address: "Machinist, N. Y."

New York District O
JAMES H. McGraw, President
JAMES H. McGraw, Jr., V.-P. and Treas.
MALOOLM Milk, Vice-President
EDWARD J. MERHEN, Vica-President
MASON BRITTON, Vice-President
EDGAR KOBAK, Vice-President
C. H. THOMPSON, Secretary
WASHINGTON:

Washington: National Press Building CHICAGO: 7 S. Dearborn Street

7 S. Dearborn Slicet
PHILADELPHIA:
1600 Arch St.
CLEVELAND:
Guardian Building
St. Louis:
Bell Telephone Building
SAN FRANCISCO:
883 Mission Street
London:

Member Associated Business Papers, Inc.
Member Associated Business Papers, Inc.
Member Audit Buresu of Circulations

Engineering News-Record
American Machinist

American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal
Ingenieria Intermetional
Bus Transportation
Electric Radiumy Journal
Electrical World
Electrical Merchandising
Radia Retailing
Construction Methods

Publishers of

Electrical West (Published in San Francisco) American Mackinist-European Edition (Published in London)

The annual subscription rate is \$4 in the United States, Canads, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zune, Honduras, Cuba, Niesragua, Peru, Colombie, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brasil, Spain, Uruguay, Costa Rica, Ecuador, Gustemala, Chile and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or 29 shiflings), Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any pert of the world, 20 certs.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1928, by McGraw-Hill Publishing Company, Inc.

Published weekly. Entered as accond-class matter, June 23, 1908, at the Post Office at New York, N. Y., under the Act of Merch 2, 1819. Printed in U. S. A.

A Basic Improvement Underlies the "One-Wear" Wheel



The rate at which a wheel wears depends upon the metal of which it is made. Ordinary steel wears too fast to make it practical for use in a "One-Wear" Wheel.

The high wear resistance essential to a steel wheel that need never be re-turned can only be had in a heat-treated,

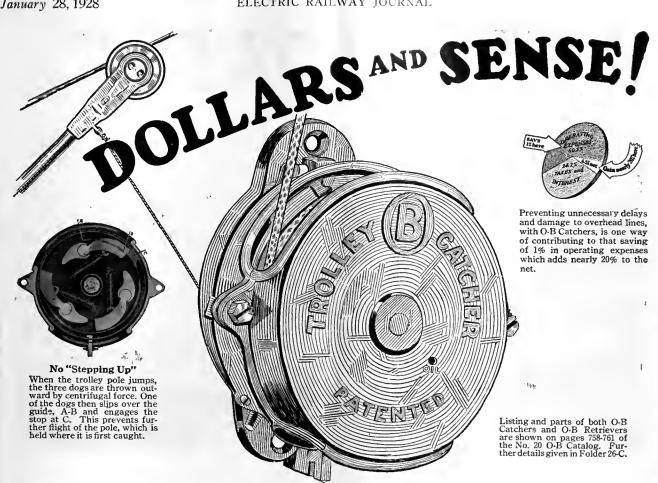


special composition wheel steel.
Such a steel is the basis

Such a steel is the basis of the Davis "One-Wear" Steel Wheel.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST.LOUIS



Every Car Needs This Trolley Pole Watch Dog

TROLLEY POLES may get a flying start when the wheel leaves the wire. They haven't half a chance, though, to cause major damage to overhead lines, if there's an O-B Catcher around. You can put your faith in the O-B Catcher to grab the rope quickly and hold it where it is first caught. For the O-B Catcher has a reputation of years standing for doing its work without faltering or halfway performance.

This reliability, even after years of service, and its exceptional sturdiness and economy, are the reasons why the O-B Catcher has been appointed official watchdog of the trolley pole on thousands of city cars the country over. Its "One Shot" lubrication system and gravity operated reel latch are only two of the important features which help to explain its popularity.

May we send Folder 26-C, which gives complete details? Address

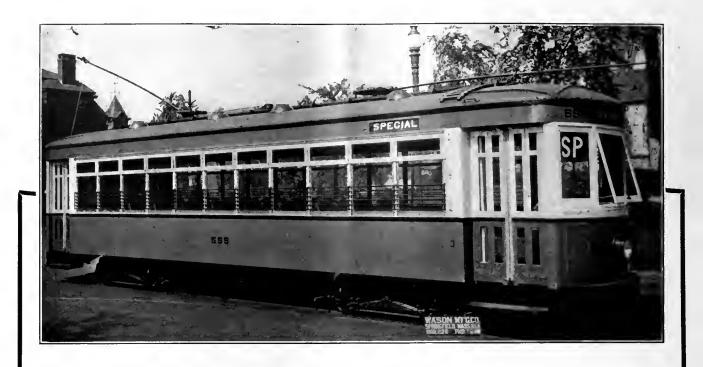
Ohio Brass Company, Mansfield, Ohio Dominion Insulator & Mfg. Co., Limited Niagara Falls, Canada 735C





PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS CAR EQUIPMENT MINING MATERIALS **VALVES**

"STANDARD"



STEEL AXLES STEEL SPRINGS ARMATURE SHAFTS ROLLED STEEL WHEELS



"Standard" Performance— More Mileage between renewals and lower repair costs.



STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA. BRANCH OFFICES:

WORKS: BURNHAM, PA.

CHICAGO ST. LOUIS NEW YORK HOUSTON PORTLAND RICHMOND SAN FRANCISCO ST. PAUL PITTSBURGH MEXICO CITY



and To-day:



KEYSTONE ROTARY GONGS

Designed for giving at a slight pressure of the foot from one to fifteen strokes—regulated at the will of the operator. This loud and distinct alarm provides an effective warning even in noisy surroundings. They are common-sense protection for both property and passengers.

Many's the time in the "good old days" when a motorman shouted himself hoarse (hurling expletives) at a wagon driver who couldn't hear his feeble gong above the clatter of the horses hoofs. And many an inspector wondered where car number "umpty teen" was because it was long overdue. In the meantime car number "umpty teen" was moseying along behind the afore-mentioned wagon.

When a big truck gets on the tracks nowadays the motorman merely steps on the button. The Keystone Rotary Gong does the rest for it quickly rouses the driver who promptly pulls off to the side. The car continues at speed and arrives on its regular scheduled time.

To learn more fully about the full line of Keystone Car Equipment, get a copy of Catalog No. 7.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pitisburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ECTRIC SERVICE SUPPLIES CO.

1 or 1000



Thermit Welds

for the repair job as well as for the extensive reconstruction program

Probably you have used and approved Thermit for extensions and for rebuilding track. Most companies have!

It's equally satisfactory, equally permanent, equally economical for repair work. Any joint in bad shape can be welded with Thermit and thus made good as new. Then it will last as long as the rail itself. No need to send the repair crew back again year after year to tighten the bolts or to build it up, and smooth it off for another bit of temporary relief. Weld it once with Thermit, and it's good as long as the rail lasts.

And the cost of even a single repair job with Thermit, is little if any more than any other kind of repairs.

METAL & THERMIT CORPORATION? 12.0 BROADWAY, NEW YORK, N.Y.

PITTSBURGH

CHICAGO

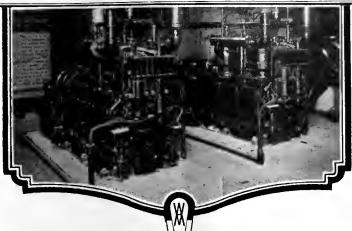
BOSTON

SOUTH SAN FRANCISCO

TORONTO



Many traction properties are using Westinghouse-National compressors exclusively in their shops and power houses.



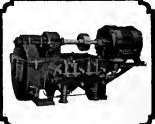
Typical power house installation showing two type "3VS" Westinghouse-Notional Air Compressors.

There is a Westinghouse National for every pneumatic requirement

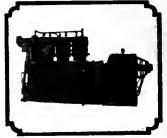
BUILT in capacity sizes, ranging from 3 to 700 cu. ft. displacement, all Westinghouse National Air Compressors are designed and sturdily constructed to render a thoroughly dependable service. Infinite care and precision throughout their manufacture has given them unique recognition as the "Quality Machines For Quality Service."

Traditionally dependable, they run quietly, take up minimum valuable floor space, operate economically, and demonstrate conclusively, throughout years of faithful service, their superiority in maintaining maximum pressure for all shop and power house requirements.

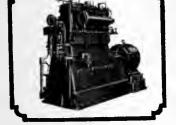
Detailed information, relative to the installation of a dependable pneumatic source, may be had by writing the Westinghouse Company, or from any of our conveniently located field offices. . . This service is maintained exclusively for the use of those interested in Quality pneumatic systems and is in no way obligatory.



Type "N" compressor... 12 to 60 cu.ft. displacement is fully described in publication T-2048.



Type "3VS" compressor... 208 to 468 cu.ft. displacement is fully described in publication T-2032.



Type "2V" compressor... 75 to 150 cu.ft. displacement is fully described in publication T-2047.

Type "3VD" compressor... 550 to 700 cu.ft. displacement is fully described in publication T-2032.

Westinghouse Traction Brake Co.

Industrial Division

General Office and Works-Wilmerding, Penna.

WESTINGHOUSE-NATIONAL Air Compressors The Safety Car Control Equipment brings economic advantages that warrant additional cars assures the quickest possible brake action provides maximum convenience and flexibility in controlling entrance and exit safeguards operation by interlocking power, brakes, and doors.



Iccelerated Transportation must be made SAFE

For the sake of their patrons . . . and their profits . . . modern railways must expedite the movement of traffic.

Today there is a growing demand for more frequent service . . . shorter, quicker stops . . . less delay at entrance and exit . . . a speedier getaway.

All of these requirements are met to an efficient degree by the use of complete protective and convenience-promoting devices . . . the Safety Car Control Equipment.

Safety Cars assure accelerated transportation — properly safeguarded.



TYLES IN TRAUM UNDER UND

4

This is No. 4 of a series on paved track design with STEEL TWIN TIES as used in over 45% of the cities of over 200,000 population in the United States. No. 5 will appear in an early issue.

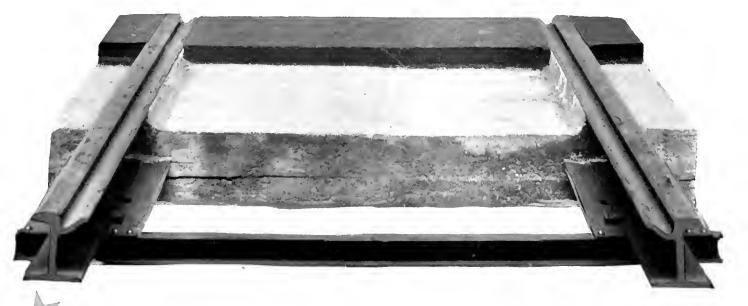






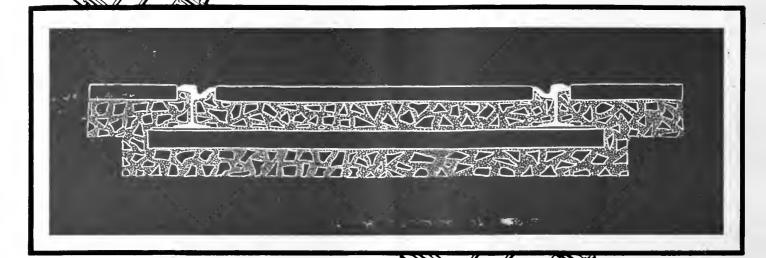


- No. 1 Cincinnati
- No. 2 Boston
- No. 3 Detroit
- No. 4 Philadelphia
- No. 5 Kansas City No. 6 Cleveland
- No. 7 Washington
- No. 8 Buffalo



STEEL TWIN TIE TRACK
THE BASE OF MODERNIZATION

In Philadelphia



STEEL TWIN TIES are furnished to the Philadelphia Rapid Transit Company with ends bent upward to cant the rail 1 in 25 and are punched for 122 lb. AERA standard rail for use in their Standard Type No. 1 construction. The rails are thermit welded and the track is paved with asphalt.

Complete detailed drawings and specifications will be sent on request.

Engineers of The International Steel Tie Company have played no small part in the design of better, more lasting track. We have in our files a fund of data on paved track construction that is at your disposal. We will be pleased to discuss with you your paved track problems, and to help you start your modernization program right. Steel Twin Ties are the first step toward better service, and lower initial and maintenance costs.

The International Steel Tie Co. Cleveland, Ohio



TWIN TIES ARE ALL STEEL

Just as Safe in the Far East



From the New York Herald-Tribune, January 1, 1928



Another Tribute to N.P. Type of Door Control

NATIONAL PNEUMATIC COMPANY

Executive Offices: Graybar Building, New York General Works, Rahway, New Jersey

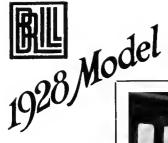
Chicago 518 McCormick Building Manufactured in Toronto, Canada by Railway & Power Engineering Corp., Ltd.

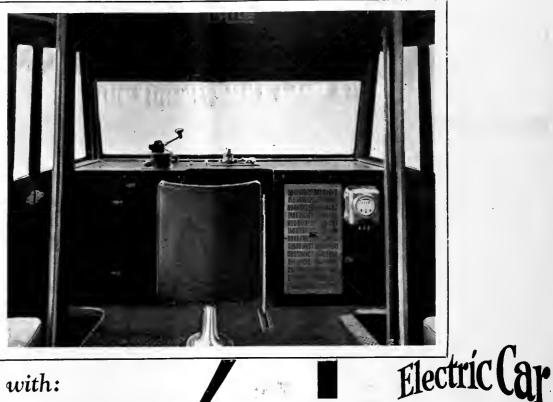
Philadelphia 1010 Colonial Trust Building

LONDON

TOKIO

PARIS





Heated with:

Consolidated, Car Heaters

Built at the G. C. Kuhlman Car Company plant in Cleveland, and equipped with Consolidated Sheath Wire Car Heaters.

The Consolidated Car Heater shown in the above illustration is of the flush type. The panel heaters along the entire length of both sides of the car are also flush with the heater ducts.

CONSOLIDATED CAR HEATING CO., INC.

Albany, N.Y.

New York N. Y.



Chicago Ill. And all heaters are regulated by Consolidated Thermostatic Control with visible Thermostat!

All Consolidated Car Heaters are approved by the Underwriters' Laboratories.

Over twenty years experience in car heating by Consolidated is at your service.





Why should an electric car be HANDICAPPED in traffic?

Years ago the electric car was easily the fastest vehicle on the streets. Today, even with its increased speed, it is necessarily nowhere near as fast as the automobile. Furthermore it is confined to the track.

And yet there is no reason why the modern electric car should be handicapped in traffic. Up-to-date motors and control can give it acceleration as good as, or even better than, its competitors. And the Cincinnati Duplex Air and Magnetic Brake can give it the stopping power that makes high schedule speeds SAFE in the densest traffic.

As an example we quote from a motorman's report turned in on a famous Kentucky property that is now "Magnetic equipped";— "Car going east; auto going west pulled around another auto going west and stopped right in front of car. Motorman avoided accident by applying his Magnetic."

Will you let us show you how little this up-to-the-minute equipment costs and how much it will earn for you, as a service booster and as insurance?

CINCINNATI CAR COMPANY
CINCINNATI, OHIO

CINCINNATI

BALANCED CARS

still a step ahead of the modern trend!

The Cincinnati Duplex Air and Magnetic Brake is one of the four "key" leatures of the Cincinnati Balanced Lightweight Car. It is available also for installation on other modern rolling stock.



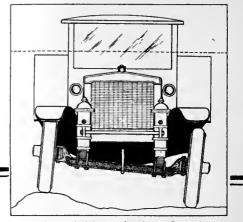


Figure 2, illustrating how air springs absorb the uneven road conditions and prevent wrenching and twisting of frame.

In Winter, Particularly Buses Need This Protection

Against Road Shocks and Vibration

THESE winter months are hard on buses. Frozen ruts and snow-piled roads make road conditions doubly brutal.

Protect your buses from these destructive shocks and the resultant vibration by equipping them with Gruss Air Springs.

Note the illustrations above. See how the Gruss air cushions absorb uneven road conditions and keep the chassis level. Mark how Gruss Air Springs protect the regular steel springs against the punishment they otherwise must undergo. Think of the maintenance saving you can effect by preventing steel spring breakage, alone.

Consider, too, the other benefits that air springs bring: Supreme riding comfort regardless of road conditions; maintenance of regular schedules—a score of other profit paying results.

You need Gruss Air Springs now. Write for complete details.

THE CLEVELAND PNEUMATIC TOOL CO. Cleveland, Ohio

GRUSS AIR SPRINGS for Trucks, Buses

Passenger Cars ~.



RESULTS COUNT

Again

Public Service

(NEW JERSEY)

Buys

YELLOW COACHES—

331 Type Z Gas-Electrics

TWO YEARS AGO, Public Service (New Jersey) placed their order for three hundred and thirty-three (333) Yellow Gas-Electric Coaches.

They did this then on the strength of long-time tests with many makes of motor buses.

Today, after two years of

gruelling service and experimentation with other types of gas-electric buses, the wisdom of their decision is proved by this great order just placed a practical duplication of the former one.

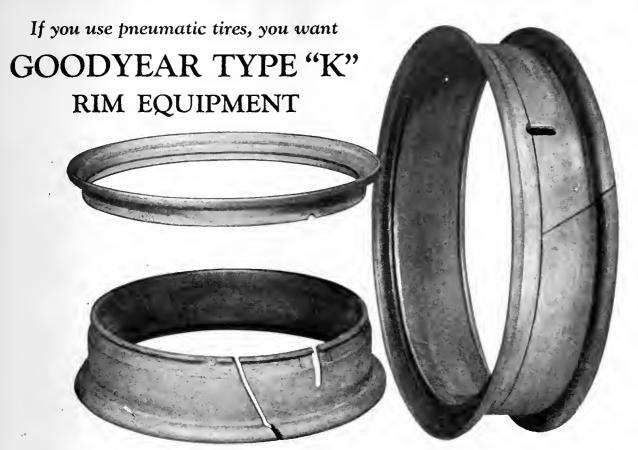
Thorough investigation pointed to Yellow Coaches. The performance of two

years now tells the same story.

Facts cannot be disputed.
Yellow Coaches win again!

YELLOW TRUCK & COACH MANUFACTURING CO. SUBSIDIARY GENERAL MOTORS CORPORATION
5801 WEST DICKENS AVENUE, CHICAGO, ILL.

HERE'S THE EFFICIENT RIM



GOODYEAR'S startling new departure in rim design has an important message for anyone interested in truck or bus transportation.

Truck Manufacturers: Every indication points to Goodyear Type "K" Rims as standard equipment for the pneumatic-tired truck of the future. Goodyear will co-operate with you in any way you desire.

Truck Owners and Truck Operators: When you change from solid or cushion to pneumatic tires—either single or dual rears, you'll find this rim equipment efficient, economical and practical.

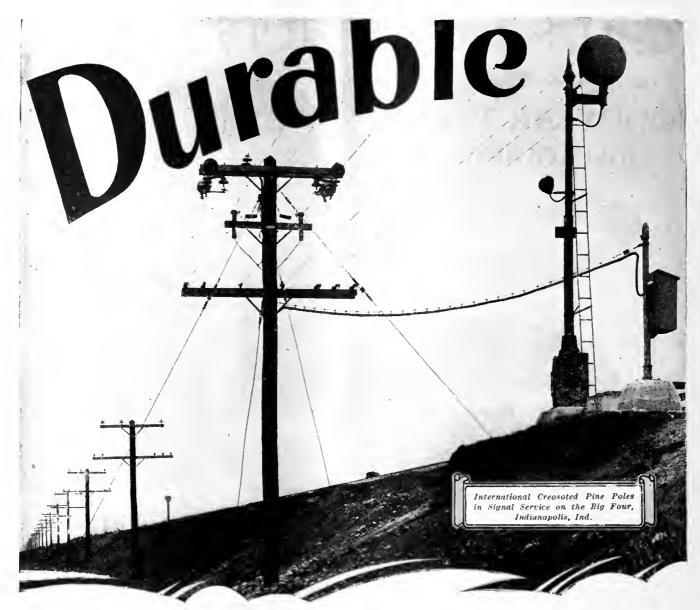
Truck Dealers and Tire Dealers: Learn about this new rim equipment. It is to your advantage. Rim distributors will help you in adapting wheels. Goodyear Type "K" Rim Equipment gives you simplicity and ease of operation in changing tires. It is adaptable to all wheels—single or dual. It combines lightness with strength. Replacement is economical. It reduces brakedrum heat through use of ventilated wheels, thus saving your tires.

May be had in a complete size range.

Goodyear Type "K" Rim is made in two parts—one endless section and one split section. Makes all pneumatic tires quickly detachable as well as demountable at the rim. Designed by Goodyear engineers. Made in Goodyear factories. Widely distributed. Guaranteed by "The Greatest Name in Rubber." Write today for complete information: Akron, Ohio, or Los Angeles, California.



Type K Truck & Bus Rim Equipment



Creosoting Prevents the Decay That Destroys Poles

International Creosoted Poles give long and dependable service because the pine pole is the strongest of the pole woods, and because that strength is made lasting by preservative treatment. Take increment borings of your creosoted poles. Notice the depth of creosote penetration. The cell structure of pine wood is such that creosote penetrates deeply; and the effectiveness of preservative treatment is directly proportional to the depth of penetration. The creosote oil is injected under pressure the full length

of the pole, far into the wood fibre and beyond the possible depth of abrasions and season checks. By this method all the causes of pole decay are eliminated.

The economic benefits derived can be readily realized by the fact that *International* Creosoted Poles have given 28 years of service and are still perfectly sound in territories where other poles have failed completely in eight to eleven years.

International Creosoting and Construction Co.

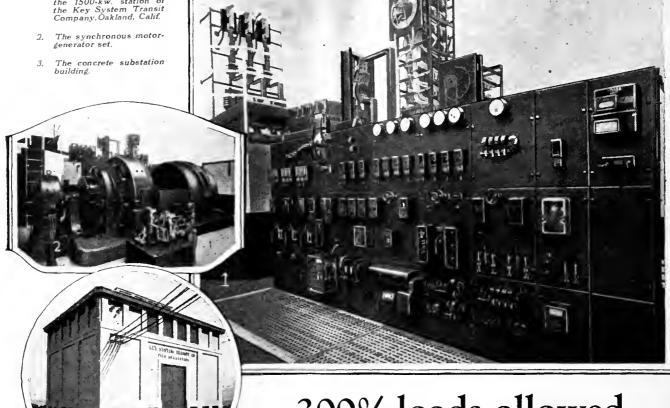
International Salveston, Texas



Creosoted Yellow Pine Poles



The main switchboard of the 1500-kw. station of the Key System Transit Company, Oakland, Calif.





This important station of the Key System Transit Company is a progressive departure from ordinary automatic substation practice. Its successful operation provides additional proof of General Electric's ability to design for the particular and peculiar demands so often encountered in railway service.

300% loads allowed and successfully handled This automatic substation of the Key System

Transit Company handles 300 per cent load until the temperature approaches a predetermined limit, then drops the load to 150 per cent and, if necessary, to 100 per cent. When cool, it again automatically takes the original load. Human operators could not be so accurate.

This station operates selectively from either of two 11,000-volt feeding circuits, automatically switching from one to the other if trouble occurs on either line. Supervision of operation from a remote point is also possible.

The removal of \$11,000 worth of copper feeder cable and a decrease in feeder losses from 22 per cent to 9.6 per cent were immediate results. An 11 per cent increase in track capacity was also obtained.

130-1

SALES OFFICES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, January 28, 1928

Number 4

A Champion for the Car Rider Arises in Philadelphia

PHILADELPHIA at last seems to be awakening to the serious nature of its traffic congestion problem. At least partial credit for that awakening must be ascribed to the shrill alarm sounded by the local transportation company. "Give the 80 per cent a square deal" has been and is still being held before the eyes and dinned into the ears of the people in an intensive advertising and publicity campaign described elsewhere in this issue. The 80 per cent is, of course, that overwhelming majority of street users who enter and traverse the downtown area by means of the street car.

The Philadelphia Rapid Transit Company is frauk to admit, in sponsoring this campaign, that its own ends will be served, as well as those of the car rider, in any speeding up of street traffic which may be effected. But it is significant that the newspapers and civic associations of Philadelphia, while realizing this fully, have been unanimous in their approval and active backing of the undertaking.

Much of today's street congestion is due to the human factor—to that spirit of impatience, of headlong speed and of indifference to the rights and privileges of fellow beings which seems to characterize city living in this 20th Century. If he is an autoist, he will park when, where and for as long as he pleases, or can get away with. He will cut in and out of traffic lanes with a mere shrug of the shoulders for the danger he is causing to others and to himself. He will block traffic for others but curse volubly when his own way is barred by another individual of the same stamp.

The pedestrian is not much better. He has little or no regard for traffic signals, anti-jay-walking edicts and other safeguards for life and limb, unless a policeman with a big stick cows him into submission. Truly, he rushes in where angels fear to tread.

Such tactics as these are bacilli from which germinate many of our present traffic diseases. If the slate could be wiped clear of human folly, our metropolitan areas could readily get along for a few years without the tremendous engineering developments in subways and elevated highways which are now being proposed on every hand to relieve street congestion.

It is a matter of education and of pleas to the common sense of the individual. That is what the Philadelphia Rapid Transit Company has been trying in its community. It is no use to call upon the strong arm of the law for assistance while public opinion remains apathetic. That same public opinion is often a very difficult thing to arouse on matters which properly should concern it. Still greater difficulty may be experienced in maintaining the sentiment once aroused.

One thing the transportation company has very

definitely accomplished with its "80 per cent," however. It has fixed the blame for traffic delays squarely upon those who are responsible. Easy enough to attack the transit organization when cars are tied up and passengers are forced to wait on chilly street corners. But the company has demonstrated to the satisfaction of fair-minded Philadelphia citizens that it is vitally interested in getting its cars through traffic on schedule time. It has planked down cold cash to get that thought across.

The Brady Award Will Help the Cause of Safety

SAFETY in railway operation has always been a prime consideration of the managements. Safety for passengers—at least reasonable safety—had to be assured, as otherwise there would be no patrons. Safety for persons other than passengers had also to be obtained because of the danger of damage suits. Yet it is somewhat remarkable that the emphasis now placed on safety by railway companies is a comparatively modern development. This is shown by the fact that the first comprehensive safety exposition in America was held in New York City less than 15 years ago.

A tremendous impetus to the safety movement on electric railways was undoubtedly given by the great increase in number of automobiles on the streets which has come about during the last decade and a half—and is still continuing. Today no electric railway organization is complete without its safety division or department. There is every reason to believe that the attention now being given to safety on most electric railway properties will increase rather than decrease as years go by. It is a matter for congratulation, therefore, that the Brady annual awards to electric railway companies for excellence in safety methods and results have been revived.

These awards were first made in 1914 when under the original deed of gift one medal was given to the company submitting the best record of methods and the two other medals were given to individual officers or employees of the same company because they had distinguished themselves by efforts to promote safety on their property. This plan has now wisely been changed so that the three awards are made to three different companies, representing respectively large, medium-sized and small properties. The change permits fairer judgment on the merits of the contestants' claims because it is obviously very difficult for anyone to fix standards of operation which will fit equally well companies with widely different outputs in annual car-miles.

The winning company in the largest class this year, the Louisville Railway, is very closely associated in the minds of most railway men with the modern safety movement. This is partly because of general knowledge of what the company has done along these lines. It is also partly due to the active interest which its president, James P. Barnes, has always taken in matters relating to safety. The safety work of the other two winners, the El Paso Electric Company and the Tide Water Power Company, are less well known only because of their smaller size, so that their efforts have been on a less extensive scale. But the records show that both have accomplished wonderful results.

An account of some of the safety methods in Louisville appears in this issue. Later issues will tell of the work done by the other winners.

Mileage and Securities in Receivership Materially Reduced

J UST as 1926 showed an improvement in the number and importance of electric railway companies in receivership over 1925, so 1927 showed an improvement over The situation of the Chicago Railways is peculiar in that the principal of the bonds is in technical default, but the interest payments are being made from earnings that are in every way more than adequate for all the company's financial purposes. There the ability to refund was to a very large measure presaged on the settlement of the franchise situation. That property, through no inherent fault of its own, is the only large city system still subject to the jurisdiction of the courts. The Des Moines case is also peculiar in many respects, since that company was unable to refund one of its maturing obligations. There the earnings situation is not so auspicious as is that of the Chicago company, and while it is a cause for anxiety, the concern is more over general economic conditions and the uncompromising attitude of labor, which has refused to co-operate with the company to the extent of making it possible for the railway to put into effect economies that would have helped materially to avert the receivership.

As to the facts and figures of receivership for 1926 they show a decided reduction in mileage, capital stock and funded debt involved in such proceedings. The biggest help to this end was the lifting of the receivership of the United Railways in St. Louis with its 450 miles of track. The way had long been prepared for this change, but it was not until quite recently the St. Louis Public Service Company, the successor road, formally took over the property. The delay there in carrying out the plan was undoubtedly due in no small measure to the franchise situation, still to be settled by the enactment of a new grant modern in its terms.

Two large interurban properties are still in receivership, the Detroit United Railway and the Union Traction Company of Indiana. Each of these roads has more than 400 miles of track. Only six of the remaining 48 companies in receivership at the close of the year have more than 100 miles of track. Eight of the 48 companies have 50 or more miles and the balance of 34 companies have less than 50 miles of track.

These are merely the major factors. The details were given in the Jan. 14 issue. Taking into consideration the reduction of almost 13 per cent in mileage and $22\frac{1}{2}$ per cent in securities involved in receivership and with the prospect of several of the large companies reorganizing this year, the outlook for 1928 is more encouraging than it has been for many years.

San Francisco's Municipal Railway Is No Exception to the Rule

AFTER allowing for charges that practically put it A on a par with privately owned companies, the Municipal Railway in San Francisco piled up a loss of \$240,228 for the year ended June 30, 1927. The details are given in the issue for Jan. 7, but the matter deserves attention beyond mere presentation of the statistical data. Let it be said at the outset that great perspicacity has been shown in the management of the system. No one can gainsay that. Despite this the record is not the rosy one some of the proponents of municipal ownership paint it. The earned surplus for the $14\frac{1}{2}$ -year period of operation is \$2,835,000, but when the comparison charges intended to bring the property into line with the burdens a private company would have to bear are taken into consideration the system, operating under a 5-cent fare, is found to be in the red about \$314,000.

At first blush this appears to be pretty good. But it must be taken into account that the railway is one of only 74 miles, operated from its inception in one of the most populous sections of the city. Now there are 11.89 miles of bus lines doing none too well. One of the most vociferous of the advocates of the system says that under conditions prevailing prior to 1917 the railways in San Francisco could easily have paid for themselves out of earnings on the 5-cent fare. It is a nice hypothetical question, but it does little good so to speculate since the times have changed greatly, as the report under review indicates. In this case it is a condition and not a theory that confronts the system, which is gradually being brought into a state that more nearly approximates the condition of the average privately owned system.

A champion of municipal ownership has said that doubtless the new lines and the added bus routes are useful in the development of the outlying sections, but "they are putting a strain on the 5-cent fare." Even its proponents now admit that under present conditions it is apparent that for the future, with even the most conservative extension policy, the municipal railway cannot hope to carn a substantial surplus above interest charges, without making any provision for bond redemption or the construction of extensions out of earnings.

Dallas Should Heed the Plea of Its Railway

CASH fares of ten cents are asked by the Dallas Railway & Terminal Company in a request filed with the Board of Commissioners of that city. The other fares would be 5 tickets for 35 cents, with students' tickets at 4 cents, and children 5 to 12 years of age, 4 cents. The point made by the company is that by establishing an adult cash fare of 10 cents it is possible to give the regular user of the service a much lower rate than if a flat fare were established for all classes of riders.

At first sight this plea would not seem to be unusual. In some of its aspects it is not. It reflects the changed trend in economic conditions which has imposed unusual burdens on the electric railways, but more than that, it reflects conditions which beset the railway in the moderate sized city—Dallas has a population of 211,600—determined to keep its property up and to give the very best service possible. That, of course, cannot be done:

without the constant expenditure of money. What the company now seeks is to keep up its credit standing, since in order to attract new capital to provide for extensions, betterment and improvement at reasonable cost the company's net earnings after the payment of operating expenses should be sufficient to pay a reasonable return on the property value, and in addition to accrue regularly to the various reserves enough to maintain them at normal, as defined in the franchise.

This is substantially the way the company put the case. Its plea has been referred to previously in Electric Railway Journal. Since the company began operation under the present modified service-at-cost grant on Oct. 1, 1917, it has failed to receive the full 7 per cent per annum on its approved property value by the sum of \$536,331. Between April 1, 1926, and Dec. 31, 1927, the company expended \$1,350,000 on improvements. During the next five years \$2,228,000 will be needed for similar work, \$1,050,000 alone for cars.

Dallas has long enjoyed one of the most up-to-date services in the country for a city of its size. It can, however, continue to enjoy that service only as it sees to it that its railway is adequately compensated. The Dallas railway has certainly played fair with the city. If it is to continue to prosper and grow as a city, Dallas must play fair with its railway.

Reno's Road to Transportation Ruin

CESSATION of service by the railway in Reno, Nev., last fall attracted considerable attention. Many newspapers and publications referred to the matter as indicating the passing of the street car, since it was stated that buses would be put in the service to replace the railway. If memory does not play false, even Arthur Brisbane took occasion to pen to 7,000,000 people, or whatever number it is he reaches in the chain for which he writes, a homily for their delectation. But that is quite a long while ago and Mr. Brisbane lives in the future, not in the past.

But the present concern is with the facts, not with prognostications affecting a whole industry tossed of by a sage who writes as he runs. What are the facts? The Reno road was one of 7.5 miles, built in a city of 12,016 population, not counting the flotsam and jetsam on the way to other experiences. There were six cars. The road represented the elation of promoters who sought to put in railway systems just north, east, south and west of every water-tower town that had hopes of springing into a metropolis. This is no reflection on Reno. It has a right to its ambitions and enthusiasms. But the record of Reno in history is not likely to rest on the fact that the railway there gave place to buses nor on the subsequent fact that the buses in turn have had to suspend service.

Not so much has been made of this latest fact, however. For some reason it is not the same savory morsel for comment as the passing of the railway. Reno has its place, as many people of both sexes have learned, but it is not the place for the bus or the trolley. This is no conclusion thrown off lightly in a moment of exhilaration. It is based on a plain statement of fact contained in a ponderous volume apparently unknown by the daily newspaper columnists and commentators. This big book is known as "Moody's Manual of Investments." It is a prosaic tome at the sight of which the inspiration of the literati would be immediately dispelled. This

book is freezing in its formality, but it does contain facts.

For the three years that this volume records the earnings of the Reno road it sets down the gross at \$40,641 in 1924; \$39,155 in 1925, and \$35,718 in 1926, and the deficits for the three years at \$10,770, \$4,820, and \$8,902 respectively. The company never paid a dividend. The fact is that Reno's local transportation situation is no different from that of other small communities. The fault is not with the trolley or the bus. The fault is with Reno. It is just not big enough to support any kind of organized transportation service, other perhaps than the taxi.

One Good Plan in Practice Is Better Than Many Plans in Contemplation

PERSONAL opinions advanced without facts or figures to support them constitute one of the big obstacles in the way of solving the traffic problem. Of course, every one is entitled to his own opinion on this subject, and to express it if he so desires. But personal opinions are not facts, and any satisfactory solution of the problem must be based on facts. For instance, a statement is made in a letter recently published in the New York Times that "it is doubtful whether it would be possible to increase the efficiency of the streets under present conditions by the enforcement of any regulations old or new to more than a very few per cent, whereas the situation calls for an increase of several hundred per cent." The writer of the letter believes that some sort of double-deck arrangement is the only way by which effective relief can be obtained. No data are presented to support either of his contentions.

Statements of this kind unsupported by facts or figures are not very convincing. In this instance the writer's first contention is easily shown to be false. Take Fifth Avenue, New York, for example. During the maximum hour a total of about 1,200 northbound vehicles pass 42d Street moving in two lanes at an average speed of approximately 5 miles per hour. With properly designed signal lights it would be possible for this traffic to move much faster. Experience has shown that the greatest volume of traffic moves along the street when the speed is about 15 miles per hour. No reason exists why this speed could not be attained on Fifth Avenue, New York, as has been done in various other cities. With parking eliminated traffic could move in three lanes. Under these conditions a total of more than 5,000 northbound vehicles per hour could be accommodated, an increase of more than 400 per cent.

Hope of relief from traffic congestion lies in making better use of existing streets rather than double decking streets, removing the elevated railway pillars, putting street cars underground and similar schemes. To try improved regulation and control would cost very little. The ultimate fate of such a plan would, of course, depend on the degree of success realized in use.

But experimentation is not the way of the New York municipal authorities. For fear of giving offense they hesitate to adopt any traffic regulations to which objection is made. Instead of trying any of the various reasonable plans that have been suggested for relief, the authorities continue to grope blindly for some ideal plan that will suit everybody. Meanwhile, congestion grows worse and the cost of traffic delays mounts higher and higher.

Judges Award Safety Prizes

Electric Railways in Louisville, El Paso and Wilmington, N. C., win Brady Awards. Honorable mention for Pittsburgh

S ANNOUNCED briefly in last week's issue, three Anthony N. Brady Memorial Medals for outstanding accident prevention and health promotion work on electric railways, for the year ended Dec. 31, 1926, have been awarded by the judges of the contest. The winners are the Louisville Railway, Louisville, Ky.; the El Paso Electric Company, El Paso, Tex., and the Tide Water Power Company of Wilmington, N. C. The Pittsburgh Railways received honorable mention and will be given a certificate. Announcements of the awards were made jointly on Jan. 23 by the American Museum of Safety and the American Electric Railway Association. From other statistics it was found by these two organizations that the electric railway industry as a whole during the twelve-month period covered by the contest, had reduced its fatal accidents approximately 15 per cent. Only one out of every 155,000,000 passengers carried during this period was fatally injured. This is declared to be the lowest accident ratio for any vehicle using the public streets.

The awards for 1926 were made to three railway organizations. This is a change from previous practice. The committee's purpose in this, it was announced, was to promote active competition for the awards by every electric railway, however large or small. Bus systems are included in the statistics covering the awards where these are operated as part of an electric railway system. It is expected that the presentation of the medals will take place some time in February with appropriate ceremonies.

The Brady award, originated in 1914, was discontinued during the World War after having been won by the Boston Elevated Railway, the Union Traction Company of Indiana and the Connecticut Company, and has been restored by Nicholas F. Brady at the request of the American Electric Railway Association. Gold, silver and bronze medals are awarded as first prizes to three classes of companies operating more than 5,000,000, from 1,000,000 to 5,000,000, and less than 1,000,000 vehiclemiles, respectively. Louisville, El Paso and Wilmington won in the order named.

The committee on awards consists of Lewis Gawtry, president of the Bank for Savings in the City of New York. Colonel A. B. Barber, manager transportation and communication department, Chamber of Commerce of the United States; James H. McGraw, president of the McGraw-Hill Publishing Company, Inc., and Lucius S. Storrs, managing director of the American Electric Railway Association.

The committee on the conditions of the competition consisted of Thomas Fitzgerald, vice-president of the Pittsburgh Railways, chairman; H. K. Bennett, safety manager, United Electric Railways, Providence, R. I.; C. H. Evenson, superintendent of transportation, Chicago Surface Lines.

The conditions of the contest just decided provide that every competing company shall submit accident data covering all electric railway and bus operations comprising the entire system of which it is a part, without regard to technical ownership, as well as to cover broadly and as completely as possible, all of the factors prescribed

SUMMARY—DERIVED RATIOS AND COMPARATIVE UNIT FIGURES,
RAILWAY OPERATION

RAILWAI	01 131	ATTON		
Ratio—Cost of accidents to gross	Year	Louisville Railway	El Paso Electric Company	Tide Water Power Company (Wilmington)
earnings—per cent.	1926	3.00	2.71	0.48
	1925	3.11	4.29	1.42
	1924	3.65	2.87	2.01
	1923	4.26	3.55	0.63
Ratio—Amount paid in settlement of claims to the total cost of claims— per cent.	1926 1925 1924 1923	63.34 60.12 65.31 69.50	52.46 67.23 45.32 54.23	30.41 65.31 97.03 86.52
Ratio—Cost of claims department to	1926	20.01	38.44	69.59
the total cost of claims—per cent.	1925	22.08	28.24	19.89
Bus figures included—with the ex-	1924	19.14	46.26	2.96
ception of the Tide Water Power Co.	1923	17.58	39.24	13.47
Ratio—Ampunt paid in settlement for property damages to the total amount paid in settlement of claims—per cent.	1926 1925 1924 1923	* * *	19.27 6.91 *	41.23 18.96 9.43 37.49
Ratio—Amount paid in settlement for personal injuries to the total amount paid in settlement of claims—per cent.	1926 1925 1924 1923	nt nt nt	80.73 93.09 *	58.77 81.04 90.57 62.51
Average cost per accident reported	1926	\$17.03	\$50.84	\$30.50
	1925	21.59	64.34	82.06
	1924	23.04	39.06	65.81
	1923	26.30	31.28	26.13
Total cost of accidents per car-mile	1926	\$0.012	\$0.007	\$0.001
	1925	0.012	0.011	0.004
	1924	0.013	0.007	0.006
	1923	0.016	0.010	0.002
Number of accidents per 10,000,000 car-miles operated.	1926	7,134	1,425	455 -
	1925	5,605	1,749	489
	1924	6,046	1,924	877
	1923	6,253	3,174	754
Collisions with motor vehicles per 10,000,000 car-miles operated.	1926	2,986	842	398
	1925	2,603	977	432
	1924	2,919	926	820
	1923	3,026	1,232	553
Collisions with cars per 10,000,000 carmiles operated.	1926	66	41	11
	1925	75	48	11
	1924	108	63	11
	1923	142	68	23
Collisions with other vehicles per 10,000,000 car-miles operated.	1926	206	34	11
	1925	215	42	11
	1924	284	31	23
	1923	413	83	33
Collisions with pedestrians per 10,000,000 car-miles operated.	1926	53	53	34
	1925	50	64	11
	1924	70	75	11
	1923	82	59	45
Boarding and alighting accidents per per 10,000,000 passengers carried.	1926	136	17	0
	1925	62	21	3
	1924	66	27	4
	1923	62	46	Not available

^{*}Cannot be segregated.

by the committee as conditions for obtaining the award. These factors were:

The success in gaining good will as indicated by the initiative, skill and enterprise manifested in improved safety conditions.

The improved safety conditions which have resulted from original ideas, as well as the extent to which the company has taken advantage of new development of safety in operating and maintenance practice and equipment originating with others.

Improvements in safety practice which have resulted in reduced maintenance, or greater reliability of service.

Particular success in conducting a safety program and actually reducing the number and seriousness of accidents.

Outstanding accomplishments in development of co-operation between management and employees in safety promotion.

Outstanding accomplishment in measures to promote sanitation and health.

All presentations had to be in the hands of the American Museum of Safety on or before August 1, 1927.

Accompanying the report of the committee was a series of tables compiled from the statistics submitted. One of these, as relating to the winning companies, is presented herewith. An article on some of the safety practices of the Louisville Railway appears elsewhere in this issue. Particulars of the practice of the three other companies which won for them prizes or a certificate will appear in subsequent numbers.

Safety a Science at Louisville

Winner of Brady medal prize for 1926 in large road class has devoted a great deal of study to safety precautions. Safety council is conducted by the employees. Various ways are adopted to maintain interest



The driver of the automobile at the right is warned by the "car turns" sign that the car is about to turn

ABANNER displayed in one of the buildings of the Louisville Railway reads: "Our safety ambition—to be the safest railway in America." It hangs in the hall where the company holds a dinner every month, at which the guests are the transportation employees having the best safety records during that month. This slogan, followed consistently and continuously, has won for the company the 1927 Brady medal for the best record in safety companies in its class, that is, to those operating more than 5,000,000 vehicle-miles during the year ended Dec. 31, 1926.

While officials of the company do not believe that safety is primarily a matter of equipment, they realize that good men with good tools can accomplish more than good men with poor tools. For this reason a great deal of thought has always been given to improved equipment and appliances which promise to reduce the number of the company's accidents. Several especially novel innovations were tried out during 1926. Among these may be mentioned "car turn" signs; the construction of additional safety zones and the shortening of the car lifeguards.

The "car turn" signs, of which one is illustrated, were installed at locations where experience had shown automobiles trying to pass on the right frequently hit street cars when the latter were making right-hand turns. The required equipment includes a red projector, a flood-lighted sign, fitting and clearing contactors in the trolley wire, and a relay in a box mounted on a pole. When

used with a Cheatham switch, the same operation of the car under the Cheatham contactor that throws the switch point before the diverging loop shunts out a relay in the normally closed circuit. This causes its armature to drop to a back contact, closing a circuit to illuminate the red projector and to floodlight a sign reading "car turns." The projector is equipped with a 50-watt lamp in a 9-in. parabolic glass reflector with red covered glass, the whole supplying a light that is brilliant even in daytime. The floodlight also has a 50-watt lamp in series with the pro-After the car has turned it passes under a normally open contactor of the short type, which picks up the "stick" relay again and thus removes the indication. This display of signals not only gives a warning, but explains the reason for it. The installation of these signs has greatly reduced accidents of this kind.

Forty-nine safety zone markers were installed on Broadway, the main artery for automobile traffic from the eastern and western sections of Louisville to the center of the city. The Louisville law had prohibited motorists passing standing street cars. This not only tended to delay automobile traffic but there were cases where automobile drivers failed to stop, striking boarding or leaving street car passengers. As the width of the thoroughfare made the establishment of safety zones practicable, several were installed. The zone markers are concrete pillars, roughly $3\frac{1}{2}x6$ ft. in size. They are substantial enough to stop the most reckless driver. Their installation was completed early in 1926. The

local law was then changed to permit motorists to pass standing street cars. Since the safety zones were installed very few persons intending to board or leave Broadway street cars have been hit.

In addition to these zones eleven loading platforms were built on Broadway. They have a wooden base, roughly 6 in. above the surface of the street, and are 80 ft. long and 4½ ft. wide. At the end toward which traffic is moving on the side of the street where they are located, they are protected by one of the safety zone markers previously described. An iron railing runs the full length of each platform on the side past which traffic is flowing.

As another safety precaution the lifeguards on the cars were cut back so as to keep them in line with the bumper. This was done because police regulations in Louisville permit automobiles to pass street cars on the left. In practice it was found that the driver of many an automobile, in passing a car on the left, had to be in a hurry to get out of the way of traffic bound in the opposite direction and would cut back into his own traffic lane before he was far enough ahead of the street car. The result was that he frequently ran over the lifeguard of the car that he was trying to pass.

Besides this change in the car equipment in the interests of safety, the company has introduced on its cars features to improve sanitation. In a sense, they might properly be included as part of its safety work, as they tend to protect the health of the patrons and employees. The more important of these will be briefly mentioned.

All car ceilings are painted white to give the best light possible. Sanitary hand straps have been installed. Rear concealed vacuum type ventilators have been adopted.

A form of "waste basket" has been installed under the body of each car. The dirt and rubbish on the floor of the car at the end of each run are swept into these baskets rather than on to the ground or deposited in tin cans at line terminals. On safety cars the position of the heaters has been moved forward to give better distribution for both operator and passengers. Wooden strips have been added on the platforms where the motormen and conductors stand, to give them dry footing.

After All, Safety Depends on the Employees

The officials feel, however, that by far the greatest factor in its safety work has been the interest of the employees in it. Seven years ago, or on April 12, 1921, the Louisville Railway Safety Council was organized, as one of the functions of the Louisville Railway Co-operative Association, the association of the employees of the Louisville Railway and its subsidiary companies.

Operating under the safety council, and forming part of it, are twenty local committees, each made up of three men from each carhouse, power station or other unit division of the organization. These local safety committee men, as they are termed, are elected by the men of their units, and serve three months. They wear badges indicating their position. Their duties primarily are to make a thorough inspection of their unit at least once every two weeks, to report on unsafe conditions found, to give personal attention to fire equipment, lighting and sanitary conditions, to conduct safety educational activities and to supervise the instruction of old and new employees in the hazards that apply to their unit. The fact that the term of service is only three months makes it possible over a period of a few years to bring a majority of employees into personal contact with the safety movement through membership on these committees.

Once a month the twenty unit chairmen meet and exchange safety ideas. The company's director of safety

presides over these meetings and he is the only officer of the company who takes an active part in the functioning of its safety council.

Once a month an inspection committee, composed of one man representing each kind of work, makes what is known as a monthly inspection trip. This inspection committee consists of a power house man, a track man, a man from the line department, one motorman, one conductor, one man from the shop, one office man, the director of safety, and the secretary of the co-operative association. who also acts as the secretary of the safety council. Without giving advance notice of the time when it may be expected, this committee goes over every piece of the company's property from a safety point of view.

The safety council also takes the lead in arranging safety rallies of different units on the Louisville company's property. These rallies have been found invaluable for arousing the enthusiasm essential to the accomplishment of the company's safety program. As a rule such a rally is held at each unit approximately once in every three months.

These rallies take two forms. One is a very short affair, attended only by the men at a given unit with brief talks by the director of safety or superintendent of transportation. The other kind ordinarily is held at night and is attended not only by the employees but also by their wives and sweethearts. Here there are two or three brief talks on safety, but refreshments are served, generally there is a musical program, and frequently the evening is ended with dancing.

MONTHLY ACCIDENT CONTESTS

The safety work in Louisville is backed up by an appeal to the competitive instinct that is inherent in all men. This appeal has as its main feature a monthly accident contest between the various carhouses on the company's property. A dinner follows as a prize to the men of that carhouse who during the calendar month operate the greatest number of miles per accident. Two dinners really are necessary, one at noon for the men having night runs and one at 7 o'clock in the evening for the men who are on the road in the daytime.

The program followed is designed primarily to entertain the men present, on the theory that it is not necessary to talk safety to men who have won one of these dinners. As a rule there is music, one or two vaudeville acts, a moving picture and a short talk by some prominent guest. To avoid a tendency to rest on its laurels on the part of any carhouse that has won one dinner, the custom was established of permitting the employees of a carhouse able to win a dinner two months in succession to invite wives and sweethearts to the second one.

As interest in the monthly contest grew, the mileage per accident necessary to win a dinner steadily increased. In 1922 and 1923 it was no uncommon thing for a carhouse to win a dinner with an average of 6,000 miles per accident. In November 1926 the carhouse that won the dinner operated 79,651 miles per accident. A change has also been made in the regulations governing the dinner. Now, the men of any carhouse that operates 25,000 miles per accident without winning a contest in any calendar month are invited to that month's prize dinner as special guests.

The company has nine carhouses, and each month the men at each carhouse elect a safety captain to serve during the period of that month's contest. In addition to his other work he virtually acts as a "pep" leader. He does not receive any extra wages, but the company gives the captain whose carhouse wins the accident contest a

new suit of clothes as a personal prize. Apart from this no bonuses of any kind are paid in connection with safety work on the property.

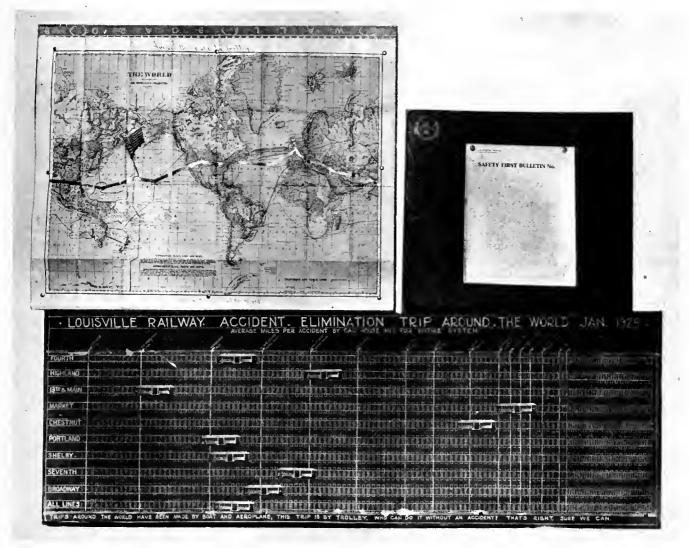
Another feature of the company's safety policy is to vary from time to time the method of indicating the day by day standing of the contestants. This keeps up the interest. A recent method is shown in an accompanying illustration. It is known as the "Around the World Safety Trip." It was originally used in 1925 but was continued well into 1926.

A map of the world, girdled to show the route to be followed, was posted in the carhouse on the theory that any carhouse which operated an average of 25,000 miles

medal to the employee who during each calendar year rendered in his individual capacity the most efficient or useful service to the public. To this prize the company added another to go to the same individual of a trip to that year's A.E.R.A. convention.

For 1925 the prize was awarded to a conductor who had expended an enormous amount of energy and his own time upon safety work. For 1926 the prize was given to a motorman who had avoided injury to a child through extraordinary precautions.

A number of other features of the safety program of the company have been worked out carefully, but no attempt is made to enumerate all of them here because



A hypothetical trip around the world is conducted monthly to encourage individual carhouses to make at least 25,000 miles per accident

per accident would succeed in encircling the globe in safety. Below the map was a blueprint showing the records of the different carhouses, with a representation of a car on each horizontal line to indicate the standing of that division. Bulletins based on the world trip idea were issued during the month to stimulate interest in the contest. Thus one bulletin would say that a carhouse unit "had reached Hong Kong, where great care in operation was necessary on account of dense traffic," or that it had come to Bagdad which was "a long way from home, but if you keep your mind on your business, we can make this trip."

In the fall of 1925 an anonymous director of the company offered an annual cash prize of \$75 and a gold

of the lack of space. A few words should be said, however, on the results.

In the first place, the campaign has undoubtedly increased the good will of the people of the city toward the company. They cannot but know about what is going on because of the publicity given to the monthly dinners to the men and to other events. With this good will has come also a greater realization by the public of its obligation to take safety precautions.

There have also been notable reductions in expenditures in settlements for accidents, in spite of increased car mileage and motor vehicle registration. Some of these are shown in a table published in this week's issue on page 148.

Double-Reduction Motor Drive with Spring Suspension

By C. Bethel

Manager Railway Motor Engineering Westinghouse Electric & Manufacturing Company

Demands for more rapid and attractive street car service led to the development of the doublereduction gear drive with spring supported motors. Oil-tight gear case is an additional advantage

RMARKABLY quiet operation has been obtained with a double-reduction gearing, known as the W-N drive. It has made possible a maximum gear ratio of 10 to 1, as compared with the ratio of single-reduction gearing of about $3\frac{1}{2}$ to 1. This of course permits the use of a light-weight high-speed motor. Along with this higher speed the motor has been designed to reduce to a minimum the magnetic and windage noises. Since the entire motor weight is spring-borne, the hammer blows at rail joints and on special trackwork are reduced, which also assists in obtaining quietness of operation. When it is considered that today noise is one of the least desirable characteristics of a street car the importance of these features is evident.

Timken roller bearings are used throughout. With them it is possible to maintain gear centers with accuracy and to ensure that the gears will mesh along the pitch line. Helical gears are used, the face and the helix angle being chosen so that three teeth are always in contact at the pitch line. This insures quietness and freedom

from vibration.

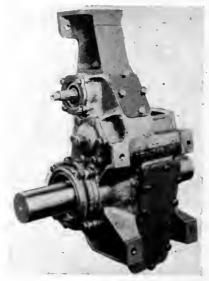
A further inc

A further increase in the gear life is assured by enclosing the gear case so tightly that the gears may be run in an oil bath. This answers the demand of a number of progressive operators, who for a number of years have seen the need for an oil-tight gear case.

The original W-N drive, in experimental form with single-reduction gears, was placed in service in Wheeling, W. Va., in November, 1925. The present W-N drive differs from the original mainly in that double reduction gears are used. This gives a maximum road clearance.

The gear case is a rugged one-piece casting. A split gear case, which would permit more ready assembly of the parts, was not used because it would reduce the stiffness of the gear unit and would add joints that would have to be kept tight. While one of the gears or gear bearings might be removed more quickly were the gear case split, the unit construction requires a less frequent gear removal. The unit can be assembled on an axle without disturbing any of the gears or bearings, and the assembled unit may be put on or taken off the axle just as readily as an ordinary gear.

The entire motor is spring supported, and approximately half of the weight of the gear unit is spring borne. The assembly of truck with motors and gears has an extremely low unspring weight. The motor is mounted on trunnions and is connected to the gear unit



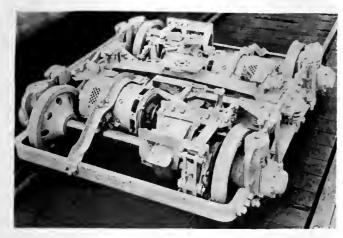
New Westinghouse W-N drive unit for light-weight, low-floor cars

by an extra heavyduty flexible coupling or universal joint, designed especially for railway service. The trunnions are connected to swing links supported from a member extending from the truck transom to the cross-member behind the wheels.

The gear unit is supported on the axle through two tapered roller bearings and on the other side to the truck transom. Thus the motor and about half of the gear unit are spring suspended. The univer-

sal joint and the trunnion swing links provide for the slight movement of the pinion shaft relative to the armature shaft. In addition, the universal joint is flexible torsionally, which gives further protection to the motor and gears from the driving forces. This makes the mounting completely flexible both as to suspension and drive. This is quite important. Most railway motor troubles are either directly mechanical or have a mechanical origin. Such troubles are broken leads, chafed coils, loose coils, worn and broken bearings, poorly meshed gears, gear vibration, chipped and broken brushes, and loose parts. The flexibility of this mounting and drive greatly minimizes the forces tending to cause trouble of this nature.

There has been a definite trend in motor design toward lighter weight. This trend is illustrated in an accompanying graph, where the weight of the motor complete with gear and gear case is plotted against one-hour horsepower. Curve A shows the weight of the old line of split frame motors. Curve B shows the modern box frame, axle hung motors. Curve C shows the new line of motors for W-N drives. A similar set of graphs shows weight plotted against tractive effort at the one hour rating. Table I gives another illustration of the trends in design.



The W-N drive and No. 1425 motor applied to truck of light-weight car

The average weight of representative motors, including gear and gear case, is 67.4 lb. per horsepower for the split frame motors, 42.7 lb. per horsepower for modern box frame motors and 28.3 lb. per horsepower for the W-N drive motors. These compare with the weight of three modern European motors designed for Cardan shaft drives of 31.5 lb. per horsepower without gears, couplings, or driveshaft. The remarkable lightness of the modern W-N drive motors is due to high speeds, improvements in ventilation, class B insulation, and to the use of 300 volts per motor, two motors being connected in series on 600 volts.

An unusual feature of the motors is that they are designed to run two in series on 600 volts. Everyone who has had experience with light-weight, high-speed motors with 600 volts per commutator realizes the advantages of reducing this to only 300 volts. Where the space is restricted and the diameter is small the commutator bars must be very thin when an adequate number for 600 volts are used. The distance between brush-holders is also short. With 300 volts per commutator fewer bars are required and a better mechanical structure results; the volts per inch of periphery are cut in two.

Hence flat spots, poor commutation and flashing should be practically eliminated. The use of 300 volts gives a larger motor rating for a given weight and space, and the machine is much more stable electrically and rugged mechanically.

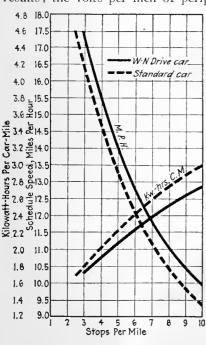
There are several reasons why 300-volt motors of the axle-hung type have not been used. Until recently a fairly large part of the cars purchased had two motor equipments. It was more economical to have a motor to serve for both two- and four-motor equipments. Motor speeds suitable for the standard single reduction gearing are not beyond the range of reasonable 600-volt design, and commutators are large enough to operate safely on 600 volts.

The last two reasons hold for all standard axle-hung motors with the possible exception of the 25-horsepower size, which is just about at the limit of good design from the standpoint of commutation and flashing. In fact, it sometimes has appeared that safe limits have been exceeded.

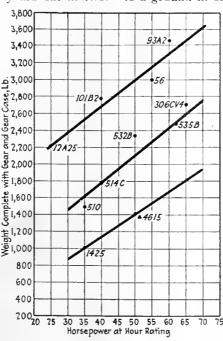
With the development of high ratio gearing for other purposes, efforts were made to take advantage of it in the motor design. Since gear ratios up to 10 to 1 are entirely feasible, this ratio was used as the basis of investigation. It soon developed that it is easy to build a 35-hp. motor that is adequate mechanically to operate at the speeds required for this gear ratio. But it also developed that the commutator of a 35-horsepower motor running at such speeds is smaller even than the commutator for the standard 25-horsepower machine.

The electrical stability of a motor depends on number of commutator bars, volts per inch of commutator, and commutator speed. In a high-speed 600-volt motor either the number of commutator bars must be seriously reduced or the bars made quite thin, and the volts per inch of commutator and the commutator speed are seriously increased. For 300-volt motors the mechanical strength of the armature limits the armature speed. Electrically the 300-volt motor is very stable.

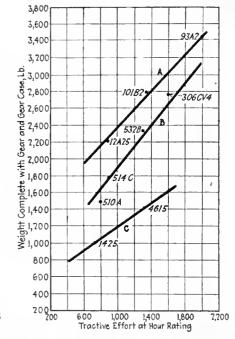
The type 1425, 300-volt motor developed for the W-N drive is insulated for 600 volts. Full line voltage, due to a ground in one of the motors of a pair, or to severe



Operating characteristics of new W-N driven car and standard car



Trend in design of lighter motors per horsepower



Trend in design of lighter motors per pound tractive effort

wheel slippage may be applied without damage. While such conditions may cause flashing sometimes, it is not the occasional flash that runs up the maintenance. It is the continued flashing of the same motor. Furthermore, there is a great difference in the effect of a flash on a 300-volt motor as compared with a 600-volt motor. The small, high-speed 600-volt motor is very sensitive to flashing and the commutation is none too good. When a flash occurs the commutator may be roughened slightly. Owing to the inherent instability this provokes one flash after another, until a definite flat spot is started. Once a flat spot is developed the only cure is to turn the commutator.

When a flash occurs in the 300-volt motor any slight burning of the commutator is not nearly as likely to cause another flash because of the inherent stability of the motor. The commutator has a fair chance to take on a polish and free itself of further danger of flashing. The 300-volt motor is, therefore, much less subject to flashing, but the flashes that do occur are not nearly as likely to result in a repair job as a flash on a small high-speed 600-volt motor.

The conductors of 300-volt motors are twice the size of those of corresponding 600-volt motors, providing a more substantial armature winding and affording better seats for the bands. The problem of broken leads is less serious with the larger conductors. The substantial armature construction and improved commutator design permit of high peripheral speed. In the smaller sizes the 300-volt motor permits a more economical use of materials. Other things being equal, the 300-volt motor is lighter than the 600-volt motor.

The successful operation of the Springfield and Joliet cars with two Westinghouse motors in series on 600 volts, and the high accelerating rates obtained in the tests of the car with W-N drive, indicate a freedom from slipping of wheels. Similar successful results with 600 and 750-volt motors in series on 1,200 and 1,500 volts confirm the same thing.

EUROPEAN EXPERIENCE VALUABLE

While railway problems in Europe differ materially from those met with in this country, certain aspects of European experience furnish a valuable guide for American development of new street car drives. Various kinds of street car drives have been experimented with in Europe for the last six or seven years. The motors used do not differ materially in weight efficiency from those of the standard axle-hung type used in this country. The average weight of representative motors, without gear and gear case, is 38.1 lb. per horsepower for domestic box-frame motors, 31.5 lb. per horsepower for European Cardan drive motors, and 15.5 lb. per horsepower for the W-N drive motors.

The principal reason for this great difference in motor weight is the almost universal use of two-motor equipments in Europe. This compels the use of 600-voit motors. One prominent European manufacturer states that full advantage cannot be taken of the higher gear ratios possible with the new drives because of the limitations of 600-volt design. In spite of this the new types of gear drives have made great progress in Europe. The most common type is the bevel gear drive developed in Paris. More than 500 cars equipped with this drive are in service. There also are a number of double reduction spur and bevel gear drives, some double reduction spur gear drives, and a few worm drives in service in Europe.

Use of the single-truck car has also influenced the gear

TABLE I-WEIGHTS PER HORSEPOWER FOR VARIOUS MOTORS

Type	Horsepower	Volts	R.P,M,	Weight Complete With Gears and Gear Case	Pounds per Horsepower
12-A-25	25	500	515	2,200	88.2
101-B-2	40	500	520	2.780	69.5
56	55	500	500	3,000	54.7
93-A-2	60	500	510	3,440	57.3
510-E	35	600	1.070	1,475	42.2
532-В	50	600	665	2,325	46.5
535-A	60	600	770	2,400	40.0
306-CV-4	65	600	700	2,750	42.3
1425	35	300	2,100	1,000	28,6
1426	50	300	1,650	1,400	28.0
S.S. D340	50	550	1,300	1,320*	26.4*
AEG	45		820	1,650*	36.6*
Paris	50	550	800	1,584*	31.7*
* These w	eights do not i	nclude gear	and gear cas	se.	

drives used in Europe. Practically all of them are connected to the motor through a Cardan shaft perpendicular to the axle, so that the designer can place the motor where there is the most room for it. It would be quite difficult to place the large motors used parallel to the axle similar to the mounting with the W-N drive.

The principal reason for the development of these new drives in Europe is to reduce maintenance cost. Gears mounted in oil and dirt-tight gear cases have a much longer life than with the old type of mounting. These drives permit the motors to be spring suspended, which reduces the motor maintenance. No great reductions in dead weight have been made. It appears that no special emphasis has been placed on noise reduction, perhaps because in Europe the old cars were much quieter than cars in this country.

Ability to maintain high schedule speeds is of greatest importance. High accelerating and braking rates are the principal factors in obtaining this end. Ample capacity of electrical equipment for the weight of car handled is essential if high maintenance expense is to be avoided. The type 1425 motor with W-N drive on a car loaded to 33,000 lb. made very unusual records of accelerating and braking. Rates of 3 m.p.h. per second were obtained without difficulty and several values of between 4 and 5 m.p.h. per second were recorded during the tests. Paraphrasing the automobile advertisements, the average car will not be expected to make these rates in every-day service, but the ability to perform is present and may be called on in emergency. These high accelerating rates are possible because of the high efficiency of the drive and the ample motor capacity.

Another factor which assists in maintaining high schedule speeds is ease of passenger interchange. Low floors are most important to facilitate the boarding and alighting of passengers. The type 1425 motor with W-N drive allows 22 in. wheels to be used with 1 in. greater clearance than was formerly obtained with 26-in. wheels. This permits a low car floor with only two steps of moderate height from the ground, without ramps, which increase the cost of a car and are an accident hazard. The low floor also adds to the beauty and attractiveness of the car body.

Low Operating Cost Indicated

Operating costs should be decreased with the new type of equipment. It is light in weight, the starting resistance is low, the gears are efficient. All these factors result in low energy consumption. High schedule speeds make it possible to give a specified service with fewer cars, and at reduced labor costs and fixed charges per car mile. Maintenance costs should be low because of the low unsprung weight, the simplicity of the equipment and operation of the gears in a bath of oil from which foreign matter is excluded.

Philadelphia Tackles Its

Street Congestion Problem

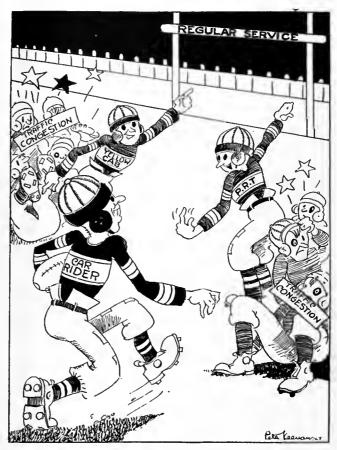
Extensive publicity campaign carried on by Philadelphia Rapid Transit Company during November and December brought public appreciation of the real causes of traffic congestion and consequent delays. Elimination of taxi cruising a major accomplishment

"IVE the 80 per cent a square deal" has been ringing through the highways and byways of Philadelphia during the late fall and early winter. Signs in the street cars, advertising spreads in the newspapers, speakers before civic associations, thousands of direct-mail contacts with automobile owners and other citizens—all of these media and more have been employed by the Philadelphia Rapid Transit Company to bring home to its passengers and to other users of the streets, the crying need for relief from traffic congestion.

Every large American city has its case of downtown congestion, with principal and minor traffic arteries "hardening" in a manner alarming both to patient and to the experts in attendance. But nowhere is the problem more serious than in central Philadelphia, where the arteries are so narrow as scarcely to be more than capillaries. Almost universal one-way operation throughout the downtown section was adopted many years ago; parking has been prohibited on many of the more narrow streets, yet today the P.R.T. is finding it increasingly difficult to get its cars through the down-town sections of the city on schedules even approaching those of a few years past.

To follow this trend to its logical conclusion would be to invite utter stagnation of all traffic, whether it be on rails, on rubber, or trailing behind old Dobbin. Those who have studied the traffic situation in Philadelphia, and indeed anywhere, realize that there is no real cure for congestion, save by providing vastly augmented highways and street space, by placing surface street car lines underground and, in general, spending great sums of money for sweeping engineering developments. Even then, the surface might soon be as crowded as before.

It is one thing grandly to suggest such moves as these; it is another thing to carry them out. Time, money and public education are required. In the meantime something in the nature of an antidote must be given the patient, if he is to live for future diagnosis. That antidote, as conceived by the P.R.T. and recommended to the people of Philadelphia by widespread publicity and advertising activity, is greater care in the use of the streets. The campaign is not one for bigger and better laws, or for more rigid enforcement of those already in existence. It is rather an appeal to the common sense of all classes of street users. It is of no avail to tell the automobilist that he should not expect to park on narrow streets and that he should not drive on the street car tracks, unless he can be shown that those selfsame tactics delay himself and his fellows every time he sits behind his steering wheel.



Cartoons like this in the "P.R.T. Co-operator" helped to carry the message over

P.R.T. has arisen as the champion of the car-rider—the fellow who, as a composite whole, is numerically entitled to 80 per cent of all the street space, yet is grudgingly accorded about 10 per cent of the space by the privately owned and commercial vehicles which monopolize the balance of the space available.

ACTION NOT ENTIRELY UNSELFISH

Perfectly true that the transportation company is serving its own ends by focusing public attention upon the traffic problem. Dislocated schedules always make the red-ink bottle perk up with anticipation. Delayed cars mean disgruntled passengers and these individuals cause thinning locks in the public relations department. The local newspapers, in commenting upon the "80 per cent" campaign, have cheerfully pointed out that the P.R.T. has a weather eye cocked leeward during all of its

vocalizings and visualizings for the benefit of the people. They have none the less been unanimous in supporting the campaign as a worth-while civic movement, regardless of how interested or disinterested may have been the motives which inspired it.

The 80 per cent of street users who are car riders in Philadelphia are, like all majorities, inarticulate except in rare instances when something succeeds in awakening a group consciousness among them. Lest this something be a super-demagogue, inspiring the public to blind and unreasoning attacks upon the transit

company, P.R.T. has felt the money well spent in laying its cards frankly upon the table and explaining just how, when and why delays in service are caused.

At no time throughout the year is there greater need for a sympathetic understanding between agencies of public transportation and their patrons than during the month and a half just preceding Christmas. The ideal Christmas presents seem more difficult than ever to locate, their cost is all out of reason, the crowds are impossible, nerves become badly bent, even if they do not break, and then the street car gets caught in a traffic jam down the street somewhere and Mr. and Mrs. Shopper stand on the street corner with a realistic picture of a cold supper forming in their minds.

This season P.R.T. was more fortunate than in the



This slogan in a circle was carried in all advertising and on the cars and buses

preceding year, for no serious snowfall occurred during the peak of the Christmas rush. In 1926 every delay in service was charged to the company, and an agitation developed which eventually led to an investigation by the Pennsylvania Public Service Commission. The result of that investigation was to give the company a clean bill of health and to fix the responsibility squarely upon the bad traffic conditions existing in the city.

The memory of the public is short-lived, however, and so it was that the slogan, "Give the 80 per cent a square deal," was created.

Entirely aside from its practical results in helping to minimize some of the causes of street delays, it has brought home to the car rider that the problems of the transportation company are his own problems as well. As a result, practically no charges have been voiced this season to the effect that P.R.T. has deliberately allowed its service to become impaired, for whatever reason. Rather, the efforts of the company toward clearer streets have met with universal commendation and public-spirited organizations throughout the city have not been slow to go on record as being thoroughly in accord with its aims and purposes.

Experience with previous campaigns had shown P.R.T. that the degree of success attained would depend almost wholly on the extent to which a single key phrase or thought could be instilled into the public consciousness.

Two Motorists



"Yes, I'm a bit late this morning, Jim. But I'll soon have the old boat ready to go. Why areo't you driving this morning?" "Well, Bill, I switched to street cars for business trips."



"How come, Jim? Thought you liked to drive your carbesides, you save time."

"That's what I always thought. But one day I sat down and figured it all out. I found I was saving very little time, if any.



"The time a fellow loses in getting his car out of the garage and getting started is no small item. Then there is the nervous wear and tear of driving through traffic-today it's real work.



"-aod when you actually get dowotowo, it means hunting a parking place, or you use a public garage—that boosts your mileage cost quite a bit."

(16)

Talk It Over



"I guess you're right, Jim. There's a lot of wasted time which we motorists never count."

"You bet, Bill. When I use the street cars I have time to buy a paper—and brush up on the day's news.



"-and I ride in safety, with oo driving worries. I am not using up valuable vitality which I need to hold down my job.



"Believe me, Bill, the 15c per day car fare stacks up more than favorably with the cost of driving your own car."



"Well, old timer, I never thought of it that way before. I'll just come along with you and give the street cars a try."

(17)

Hence the "80 per cent" idea was selected. It was woven into every message presented through the newspapers, on the cars or by word of mouth, from the opening broadside early in November up to the present time. It is expected that the campaign will continue to the end of January.

As a result of this publicity the car riders began to sit up and take notice, realizing perhaps for the first time just how numerically important a group of street users they actually were. After a few weeks a man in the street could be heard bringing "the 80 per cent" into his conversations at frequent intervals. Then the quipsters and columnists took the phrase to their respective bosoms and the success of the campaign was assured beyond peradventure.

Important among the appeals to enlist the citizenry of Philadelphia in the movement to reduce street congestion were the following:

A series of advertising messages which were given staggered

insertions in all of the large daily newspapers.

"Read-as-you-ride" folders which were given system-wide distribution in boxes provided on the street cars, buses, elevated trains and stations and in the yellow cabs operated by P.R.T.

Dash, bulkhead, ceiling rack signs and cab cards displayed throughtout the system.

Advertisements with special community appeals inserted in the small community newspapers scattered throughout the city.

Direct mail and personal appeals to civic associations to enlist

their active support in the campaign.

A special booklet entitled "Thoughts From the 80 Per Cent to the Motorist," distributed to every registered automobile owner in Philadelphia.

Press releases sent to city and community papers, supplementing the advertising insertions and covering such subjects as the actual causes of delays in street car service during the month of November, the particular causes of traffic delays on routes serving specific communities, etc.

From the illustrations which accompany this article it may be seen that the appeal was directed principally in two directions. In other words, both the 80 per cent and the 20 per cent of street users were asked to bend their own effort toward greater freedom of traffic movement. It was pointed out to the car rider that he, himself is not guiltless in the matter of causing needless delays, since his ramblings as a pedestrian and his peccadilloes as a passenger have been known to cause no small amount of confusion upon many occasions. the greatest responsibility for making a wise and effective use of the streets must be placed squarely up to the autoists, fleet owners, and other persons whose vehicles enter the downtown section.

One of the pamphlets given city-wide distribution contained a number of sketches showing a few of the more common causes of street tie-ups. Among these were all-day parking, unloading coal wagons, motor accidents, snowstorms, construction work, accidents, synchronized traffic control, unloading trucks and delivery wagons, and railroad crossings. Quite obviously it would be futile even to hope wholly to eliminate these particular bugaboos from the picture. But it was the plea of the transportation company that the various items be considered in a light of reasonable common sense, with a view to minimizing their effect upon the flow of traffic.

For example, the heads of Philadelphia's large coal supply companies were asked to consider the possibilities of making all downtown coal deliveries in other than peak traffic hours. Merchants with large delivery fleets were similarly requested to co-operate in the prevention of tie-ups due to the downtown parking of their vehicles.

As an earnest of P.R.T.'s own sincerity in the campaign, explicit instructions were issued to the drivers of all cabs and buses operated by the company to the effect that driving on the street car tracks, except when absolutely essential, would be strictly taboo. Employees of the transit company proved more than willing to co-operate in the movement, particularly after a special issue of their employee organ, the P.R.T. Co-operator, had explained in detail the purpose and aims of the traffic campaign.

P.R.T. gave the further assurance that all track construction and repair work in the central congested area would be carried on during the night hours, except in cases of emergency. But this was by no means the greatest contribution made by the company to the cause of traffic relief.

No-Cruising Plan for Cabs Was a Major STEP IN THE CAMPAIGN

On Dec. 12 the first no-cruising plan for taxicab operation to be adopted in any American city, was initiated in Philadelphia. Under its provisions the various cab



One of a series of newspaper advertisements telling the story

companies in the city agreed to prohibit all cruising for fares in the downtown district. Many additional cab stands were provided throughout the central area, there being, as a general rule, a stand behind every trolley The two smaller cab companies were purchased by the Yellow Cab Company, owned and operated by the P.R.T. This left but two major cab organizations in the field, Yellow and Quaker City.

It was agreed that all cab stands should be open to any cab operators, including independents, having a certificate of convenience by the Public Service Commission. Telephones are provided at most of the stands, for the use of Yellow and Quaker City dispatchers in controlling the movements of their respective fleets and also for the convenience of prospective cab passengers who may desire to summon a cab when one is not present at the stand.

The no-cruising plan, unique in every aspect, was developed after months of careful consideration by a committee appointed by the Public Service Commission and representing the various cab operators in the city. Its purpose, of course, was to do away with that fertile source of traffic congestion, the cruising cab. Incidentally it was expected that the reduction in "dead mileage" on the part of cabs in the downtown section would effect a very real economy in operation for the larger fleets.

Coming at the time it did, the no-cruising plan dove-tailed perfectly with the "80 per cent" campaign of P.R.T. and was the greatest single contribution of that organization to the civic movement which it was sponsoring. After an initial period of a few weeks, during which time the various wrinkles of the undertaking were ironed out and the cab-riding public educated to the necessity for "walking half a block for a cab," the plan seemed destined for unqualified success.

Co-operation from Civic and Industrial Organizations

A large number of civic associations, business men's organizations and similar groups passed resolutions commending the "80 per cent" campaign and urging upon city authorities, public utilities, autoists, fleet owners and other persons vitally concerned with the problem of traffic congestion, a careful study and wholehearted cooperation with the movement. The Westinghouse Electric & Manufacturing Company gave valued assistance by placing two of its institutional traffic congestion advertisements in Philadelphia papers during the course of the campaign.

Many fleet owners and others whose aid was solicited by direct mail appeals and by personal contacts responded in gratifying fashion and promised to tackle the traffic problem squarely, so far as their own activities were concerned. The essential logic of the proposition as pictured by the transit company appealed to common sense of other individuals and groups concerned, they being able to realize the economic loss which they themselves are suffering from ever-increasing street delays.

As a result of its experience with this most recent advertising and publicity campaign the Philadelphia Rapid Transit Company is more firmly convinced than ever that institutional and good-will advertising should embody features which reasonably may be expected to effect a saving in operating expense or an increase in earnings. The result in the present case, of course, is to speed up service through the reduction of costly operating delays.

When, as in the case of the "80 per cent" campaign and that of the "Will Livelong" safety campaign conducted by P.R.T. in the spring of 1927, good will may be built up simultaneously with a dollars-and-cents return from a reduction in operating delays or a saving in damage suits, the advertising appropriation is felt to have attained its maximum of usefulness.

Flat Car-Trailer Equipment Successful on South Shore Line

PRELIMINARY reports indicate that the flat car trailer equipment recently added to the merchandise dispatch service of the Chicago, South Shore & South Bend Railroad, Michigan City, Ind., have proved a marked success. Adopting the plan of its sister road, the Chicago, North Shore & Milwaukee Railroad, which

was the first electric interurban line in the country to establish this type of door-to-door freight service, the South Shore Line is now operating between Kensington, Ill., and South Bend, Ind., three steel flat cars, accommodating three 15-ton truck trailers each. Three heavyduty tractors are being used to haul the trailers from the company's various receiving depots in Chicago to Kensington and from all sections of South Bend to the local terminal yards where the trailers, with wheels still attached, are lifted bodily on to the flat cars. Overnight delivery is promised to users of this service, which is now offered only between the two terminals.

Work at the new South Bend freight station of the South Shore Line, which will be used to receive and distribute merchandise dispatch, is expected to be completed early in February. The new depot will be a steel and wood structure, 28 ft. x 120 ft., with a 9-ft. loading platform and complete freight office facilities.

Electric Railways to Climb the Pyrenees

CONSTRUCTION of an electric railroad between France and Spain across and through the Pyrenees Mountains is now under way. This line will connect the Midi Railroad of southern France and the Spanish railroad system that joins Barcelona with Madrid and other important cities. The electrified Midi Railroad runs through the southern part of France, sending branch lines to the northern edge of the Pyrenees Mountains. On the Spanish side are railroads with branches that approach the range, but go no farther toward France.

One of the plans which has been brought to the stage of construction is to connect Toulouse with Barcelona in a fairly direct route. Farther to the west a line is being built from Pau on the Midi to Jaca, the terminus of a Branch line Spanish railroad. The French part of the Pau-Jaca line will be electrified because of the numerous tunnels, the curves of approximately 650-ft. radius and the almost continuous grade of 4.3 per cent. The electrification will be divided into two sections, one from Pau to Bedous, the other from Bedous to Canfranc. The first section has been completed, but is operated as a steam road at present. Power for this section will be furnished by three substations equipped with 750 kw., 1,575-volt, direct-current sets, each set comprising two rotary converters in series.

The second section has two substations, in each of which are to be two 2,000-kw. sets, consisting of two rotary converters in series. These machines, which were built by the French Thomson-Houston Company, are compound excited with a special winding to allow regeneration by the locomotives. This winding modifies the characteristics of the machine in reverse operation and permits the regeneration of energy with but a small increase of voltage at the substation bus. The rotaries will be capable of 50 per cent overload for two hours. The two substations will be fed by three-phase, 50-cycle, 6,000-volt power from the central station of the Société d'Energie Electrique de la Vallée d'Aspe.

For centuries the high wall of the Pyrenees has stood between France and Spain, discouraging intercourse between them. Only where the Pyrenees fall off at the seaboard can railroads pass without difficult problems of engineering. More direct routes between the important cities have been sought and many years of study have been given to the subject.

Third Avenue System Prepares for

Bus Service in New York

Contracts have been signed for the operation of twelve routes, covering the Borough of the Bronx. With the old routes of the same company this will make more than 100 miles of bus lines. Orders are placed for 104 buses of several types

IN CONJUNCTION with the approval by the Board of Estimate and Apportionment of New York City of plans and specifications for buses to be operated in the Borough of the Bronx by the Surface Transportation Corporation of New York, President S. W. Huff of the Third Avenue Railway System, with which the bus company is affiliated, has announced the company's plans for bus service under the franchise award.

More than \$1,000,000 will be expended on four different types of buses required to meet the needs of the

borough. Contracts have been made with the Six-Wheel Company, calling for 26 double-deck, and 36 single-deck buses of the six-wheel type; with the Versare Corporation for 28 six-wheel gas-electric buses of the single-deck type; and with the American Car & Foundry Motors Company, for 14 single-deck buses of the dual-wheel type. The work of manufacturing these buses is already under way, and they will be put in service as delivery is made.

With the inauguration of service by the Surface Transportation Corporation in the Bronx, more than 100 miles of bus routes will have been added to the Third Avenue Railway System. The system has acquired and is already operating nearly 50 miles of bus routes in Westchester County, including the White Plains-Yonkers line, the Harrison-Rye Beach line, the Mamaroneck Avenue line, the White Plains-Tuckahoe line, the Silver Lake line, White Plains-Hastings line, and White Plains-Grassland line. The new Bronx lines will add 55 route-miles to the system.

Plans for garage and shop facilities to take care of the new fleet of buses are under way. Equipment of a large repair shop has already been started on company property on West Farms Road near 172nd Street. All maintenance and repair work will be done at this location. Actual operation will be out of two garages, one on the east side of the Bronx and one on the west side. The east side garage, recently purchased, is situated at 173rd Street and West Farms Road. The details of working out an operating force are also well under way, drivers, conductors, and a maintenance force now being in training.

Fare on all lines will be 5 cents with universal free transfers between all bus lines, with the exception of the two Concourse lines, where there will be two 5-cent







Type of double-deck buses for the Third Avenue Railway System.

The middle view shows the seating arrangement on the upper deck and the bottom one the seating on the lower deck



Style of six-wheel single-deck coaches for Third Avenue system



Type of dual-wheel coaches for Third Avenue system



Vice-President William E. Thompson and other Third Avenue men inspecting Versare bus at the railway's offices

zones, and the two City Island lines, on which there will be three 5-cent

According to Mr. Huff, the types of buses contracted for were selected after careful study as best adapted for modern, safe and efficient metropolitan service. All the bodies are of special design, and comprise many features that have never appeared before in urban service in this territory. The six-wheel type of bus, while new to New York urban operation, has been thoroughly tested and is in general operation in other cities, notably Detroit, Cleveland, Kansas City, St. Louis and Akron. All the coaches will be equipped with powerful six-cylinder engines and pneumatic tires.

The double-deck coaches will be equipped with comfortable seats with springs and real leather upholstering. The lower decks will be equipped with double seats and the upper decks with individual opera seats, as shown in one of the illustrations. The upper decks will be entirely inclosed when weather conditions require, and in summer wide windows will be lowered, giving the same effect as an open top. Heating systems will keep both upper

and lower decks comfortable during the colder periods. Other features include dome lights on both decks, white enameled ceilings, and walnut trim with upholstery to match. By depression of the sides of the lower deck roof, full headroom is provided in the aisle on both decks.

An important safety feature of the six-wheel single deck buses is the automatic treadle step, which is being employed for the first time in the East. Passengers board at a front entrance and alight at the rear, insuring a free flow through the bus. The treadle step only operates when the buses are at a standstill with the brakes on.

The Third Avenue paint scheme of cream and red will be used throughout the system.

The several types of buses were selected after careful study with special reference to the service which they will be called on to perform. The Concourse, which is one of the principal north-and-south boulevards in the

oute	Name	Termini	Miles
1	Concourse—138th Street	Mosholu Parkway and Grand Concourse, East 138th Street and Mott Avenue.	4.9
2	Concourse—Hub	Fort Independence Street and Sedgwick Avenue,	4.9
-	Concourse Hub	East 150th Street and Melrose Avenue.	5.7
3	Prospect Avenue	Fordham Road and Third Avenue,	
	T 70 1 1 1 1 1	East 148th Street and Third Avenue.	5.2
4	Jerome—Bainbridge Avenues	New York City Line at Van Cortlandt Park Avenue, Jerome Avenue and Fordham Road	4.1
5	City Island-West Farms	Boston Road and East Tremont Avenue (West Farma Square),	4.1
-	Only Island - West Parins	End of City Island Avenue at Belden Point, City Island	7.5
6	Throggs Neck	West Chester Square (Junction of Westchester Avenue and East Tremont Avenue),	
_		Fort Schuyler, at the Foot of Pennyfield Avenue	4.4
7	Boston Road	White Plains Avenue and Bronx and Pelham Parkway	2.6
8	Williamsbridge Road	White Plains Road and Williamsbridge Road (Burke Avenue Subway Station),	2.0
U	"Imamsbridge Hoad	Westchester Avenue and East Tremont Avenue (Westchester Square)	2.6
9	Eastchester Road	White Plains Road and East 225th Street.	
		Westchester Avenue and East Tremont Avenue (Westchester Square)	3.7
10	Riverdale Avenue		3,4
11	170th Street Crosstown	At or about West 231st Street and Broadway	3.5
12	City Island—Fordham		

[†] Including Branch Line Southern Terminal of Jackson Avenue and 138th Street.

^{*} Including Branch Line along Eastern Boulevard between East Tremont Avenue and Westchester Avenue (Pelham Bay Park Subway Station).

Bronx, is comparable with Fifth Avenue in Manhattan. For this reason the double-deck bus was selected, and the 26 buses of this type on order will be used on Concourse Routes No. 1 and No. 2.

On those lines where the load factor and the traffic were found heaviest, and frequent stops would have to be made, the 37-passenger gas-electric buses will be used on account of their capacity and rapid acceleration. On the lines where the runs are longer and the stops are less frequent the six-wheel 29-passenger mechanical drive buses were considered most appropriate. In the outlying sections which are under process of development the smaller 23-passenger buses will be operated. It was felt that with the wide range of conditions which must be met a single type of bus would not be suitable.

Prior to submitting the proposition for operation of the bus lines to the Board of Estimate and Apportionment the manufacturers and the railway management had agreed on the type of contracts they were willing to sign. The routes, termini and branch lines included in the contracts are given in the accompanying table.

Good Service Can Be Given at Low Cost

Experience in Fort Worth, Tex., shows that improved equipment gave lower operating expenses

OOD service can be given at low cost. This has Gagain been shown by the Northern Texas Traction Company, operating between Fort Worth and Dallas, Tex. In its Coffin brief last year it presented some figures and charts of operating expenses for the past six years. Since the presentation of that brief the company has forwarded later data for use in this article so that the 1927 data now are brought down to Oct. 1, 1927.

The first chart reproduced shows the operating expenses of the company from 1918 to 1927 inclusive, for both the interurban and city systems. As will be seen there has been a steady drop in expenses on both divisions since 1920.

During the summer of 1926 the company started a campaign for better service, which increased its operating costs slightly but added to its net earnings. It also brought many favorable expressions from the public. On the city division the actual decrease was from 24.6 cents per car-mile in 1920 to 15.9 cents in 1926 and 17.3 cents in 1927. These are decreases of 35.4 per cent and 29.7 per cent respectively.

The period since 1920 has been one in which there has been no change in the wage scale. The entire saving through these years has been gained by means of modernization and the use of light-weight equipment. Operating costs have been reduced principally by:

(a) 100 per cent one-man operation on city lines.

More than 80 per cent operation of city lines with lightweight cars.

(c) 13.1 per cent increase in speed of city cars since I920 and 6.1 per cent since 1925.

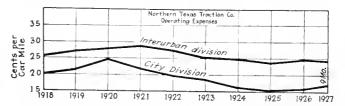
(d) Inspection of all cars on mileage basis, with a decrease in cost as the system became perfected.

(e) Installation of labor-saving devices.(f) Use of natural gas for fuel at the power house and a better form of contract through specification of price according to B.t.u.

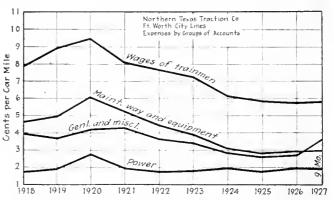
(g) Modernization of cars and use of latest devices and fixtures

(h) Education of employees, with resulting improvement in efficiency.

The second chart gives the cost of operating the city division by groups of accounts. It shows that the decline in operating costs since 1920 was consistent through all the groups up to 1927. The decline in trainmen's wages per car-mile continued through the year 1926, due largely to increases in the speed of the city cars, though revision of night schedules and changes on several lines during the day contributed to this low figure. Actually, the decreases were from 9.4 cents per car-mile in 1920 to 5.8 cents in 1926 and 5.85 cents in 1927, or decreases of 38 per cent and 37.6 per cent, respectively. As already explained, there has been no decrease in the wage scale



Nine-year chart of operating expenses on interurban and city division, Northern Texas Traction Company



Nine-year chart of primary operating expense accounts, Fort Worth city division, Northern Texas Traction Company

since 1920 and the company is operating 100 per cent one-man equipment.

Maintenance in 1926 and 1927 has shown a slight increase over the 1925 figure, but is still much lower than in any previous year. The increase over 1925 is caused by the improved service program already mentioned. The decrease per car-mile in this account, as compared with 1920, is 54.4 per cent for 1926 and 49.5 per cent for 1927. It does not indicate that a proper maintenance program has not been carried out, as during 1926, 13.1 per cent of the gross earnings was used for this purpose. The track and cars are considered to be in better shape than at any time in the history of the company.

The cost of power has remained steady since 1924. This is remarkable considering an increase in speed of 8.2 per cent over 1924 and $6.\overline{1}$ per cent over 1925 and an increase in the cost of fuel of 6.1 per cent.

The general and miscellaneous group shows a consistent decrease through 1925. In the latter part of 1926 and during 1927 considerable expense was incurred in establishing the new fare schedule, effective Feb. 7, 1927, in purchasing nickel passes and in several other ways which are not a regular charge to operation. Thus, after increasing its fare rates, the company decided to build up its accident reserve to a figure larger than that of several years past, and for a time prorated 4 per cent of gross to this account. The prorate was then reduced to 3 per cent, since this amount seemed to be sufficient to serve the purpose.

Maintenance Methods and Devices

1

Handy Sash Painting Stand

OF THE various devices that have been designed for painting window sash none has been found more useful than the rotating table. It has been reduced to its simplest form in the paint shop of the Twin City Rapid Transit Company, St. Paul, Minn., by Joseph Gabler, foreman. The table is formed of a heavy crossbraced plank with rubber blocks at the four corners and two additional rubber blocks mounted in between tor

the sash evenly, and there is no difficulty from the paint running over the glass. Since the stand and sash are rotated, the painter does not have to move while he is working, yet he does not have to reach over the sash. The sash can be reversed for painting both sides without the necessity of touching the freshly painted surface.

"Stop, look and listen" as your cars pass, then get busy on their maintenance.



A discarded barrel forms the base for this rotating sash painting stand

holding smaller sash. These rubber blocks hold a sash firmly in position when it is laid on top of the table, yet it can be lifted off instantly. The table has a length of 1-in. pipe fastened to its under side by an ordinary pipe flange. The standard is a discarded paint barrel, and the support for the pipe, in which the latter rotates, is a wooden block fastened to its top.

With the assistance of the stand the workman can paint all parts of

Salt and Sand Spreader

CALT and sand are spread along O the bus routes of the Northern Ohio Power & Light Company, Akron, Ohio, with an ingenious spreader which was made in the company's shops. The mechanism is mounted on a Model 50 White chassis, cut down in length. The power take-off for the spreading mechanism is installed on the main transmission, and from the take-off an auxiliary touring car transmission is driven. A driving shaft is run from the latter transmission through standard universal joints to a Ford axle which is mounted vertically. On the lower end of this axle is installed a disk for throwing the salt and on the upper end is a steel wheel for agitating and breaking up the salt in the hopper. The hopper is made of 12-gage steel and has a capacity of $3\frac{1}{2}$ cu.yd.

The salt feeds out of the hopper through two holes which are fitted with shutters that can be worked from the cab. By use of the auxiliary transmission any desired speed of the distributing cone can be secured regardless of the car speed.

Convenient Cabinet for Drills

BESIDE the drill presses in the Hall Street shops of the Grand Rapids Railway, Grand Rapids, Mich., a wooden cabinet for drills has been constructed. This is 3 ft. wide by 5 ft. high and has sloping shelves,



One of the sloping shelves in the drill cabinet

on which the different sizes of drills and taps used in shop work are kept. The doors can be locked so that there is no danger of theft during hours when workmen are not present. Figures underneath the various drills and taps indicate the sizes. This provides a neat arrangement convenient to the drill press.





At left—Truck used for spreading salt and sand on bus routes of Northern Ohio Power & Light Company
At right—Cone mechanism at the rear for spreading the salt or sand

New Equipment Available

Light Portable Welder

RAPID extension of electric welding has made desirable the use of light compact portable welding outfits. To meet this demand the Westinghouse Electric & Manufacturing Company, East Pittsburgh,



Compact electric welder of built-in type

Pa., has brought out a new built-in portable welder. The frame is part of the truck and the control panel is built into the framework. The equipment is lighter, smaller and more rugged than previous designs and it has a trifle better electrical performance than other portable sets.

Metal Railroad Tie Welder

WELDING equipment for making metal railroad ties from scrap rails automatically is announced by the General Electric Company, Schenectady, N. Y. By means of this equipment railroads can make their own metal ties or manufacturers can fabricate them for sale. The new welding apparatus developed for this work consists of an automatic tie-welding machine and a 1,500-amp. motor-generator set with two circuits for hand welding and two circuits for automatic welding.

The equipment includes eight essential parts: (1) A section of a roller conveyor on which the rails are moved into position for welding; (2) a jig for spacing the rails correctly and locating the tie plates on top of the rails; (3) two pneumatic plungers for holding these parts in position rigidly; (4) a pair of spring-and-toggle-operated clamps for holding the angles against the ends

of the rails; (5) a mechanism which rotates the whole jig with its rails and plates in either direction a distance of 45 deg. from the perpendicular, permitting automatic welding to be done first on one side of the tic plate and then on the other; (6) two automatic welders mounted on individual travel carriages for welding the two tie plates simultaneously; (7) a track on which the travel carriages ride; (8) a supporting framework.

The rails are inserted into the machine and the tie plates placed in position. The equipment is then held firmly by means of compressed air. The angles are next placed in position, after which the work is rotated to a point where the joints between the plates and one rail may be welded. The first welds are then made automatically, the arcs moving away from each other. The fixture is then rotated to a point where the other joints are beneath the electrode and the welds are made with electrodes moving toward each other.

While the automatic welds are being made the operator attaches the angles to the ends of the rails by hand welding. All welding being completed, the fixture is turned back to normal position and the completed tie removed.

For maximum production the machine requires two operators, one for each of the two automatic heads. Each head has a separate control panel, thus making each operator largely independent of the other.

Estimated output of the machine with two operators is one tie every five minutes.

Reflectors for Rear Ends of Buses and Trucks

WITH the purpose of reducing rear end collisions at night, the Persons Majestic Manufacturing Company, Worcester, Mass., is marketing a reflector for the rear ends of



Reflector for installation on buses

buses, trucks and other automotive vehicles. The reflectors are made with a red, green, crystal or purple lens and are said to have good visibility on a dark road from ordinary headlights at ranges up to 500 ft. Light is reflected from the double prismatic lens which has an angularity of more than 20 deg. It receives light from the car following and returns it to its source, even though the bus or truck is going around a curve. The reflector has a face of 5 in. diameter.



Automatic arc-welding machine for fabricating metal railway ties

Association Activities

Service Improvement Occupies Attention of Midwest Association

Additional details of discussion at Hot Springs Convention indicates that railway men in Mid-Western territory are keeping their eyes to the front in the effort to win increased patronage

RAILWAY executives in attendance at the recent meeting of the Midwest Electric Railway Association held on Jan. 16 and 17 at Hot Springs, Ark., a preliminary telegraph report of which was published in last week's issue of the JOURNAL, devoted their attention more to the matter of pushing further for-ward on the ground already gained in the improvement of electric railway conditions, than to consideration of past difficulties. They talked on "coming out" of receiverships, of the improvement of equipment, track reconstruction programs and the speeding up of railway service. It was most encouraging to observe that their optimistic attitude was amply backed by a serious determination to keep the ball rolling in the right direction; that railway men are more alive than ever to a realization that the newest types of street car design are subject to still further advance; that in fact the work of modernizing mass transportation facilities has only made a promising beginning.

One of the headliners on the program of the convention was C. M. Ballou, City Railway Commissioner of Cleveland, Ohio. In a paper to be abstracted in some detail in a succeeding issue of the Journal he made the point that progress in the railway industry, as in every line of endeavor, comes by one of two processes: one, a gradual change and adjustment to meet new conditions; the other one, revolutionary in character necessary only in case the former fails or is too long delayed. Reviewing as a specific performance the part played by the City of Cleveland in supplying transportation under the so-called Taylor Grant for a long period of years Mr. Ballou discussed in some detail the development and functioning of the "service-at-cost" principle first established in Cleveland.

As outlined there are but very few fundamental principles in the settlement -in fact only one central idea-"service-at-cost." As foreseen by former Judge Taylor of Cleveland, chief arbitrator in the dispute between the City of Cleveland and the street railway company and the one responsible in a measure for the adoption of the original "service-at-cost" franchise, the de-termination of a fair valuation remains to this day the chief battleground.

Mr. Ballou laid emphasis on the

point that Cleveland has in its franchise a distinct departure from the ordinary type. While it grants the railway company the usual right to occupy city streets and the privilege of operating a street railway system therein, it contains new features which involve a degree of civic responsibility not usually found in street railway franchises. Under a "service-at-cost" franchise there should be, theoretically, no dispute about the amount of service, for if more service is desired, or higher standards of service, it will cost more money and the rate of fare will be raised automatically to take care of the matter.

The natural tendency of the city is

COMING MEETINGS

Electric Railway and Allied Associations

Jan. 31-New York Electric Railvay Association, midwinter meeting, Hotel Commodore, New York, N. Y.

Feb. 13-17-American Institute of Electrical Engineers, winter convention, Engineering Societies Building, 33 West 39th Street, New York,

Feb. 17-18-Central Electric Railway Accountants' Association, Hotel Gibson, Cincinnati, Ohio.

March 23-Maryland Utilities Association, annual meeting, Emerson Hotel, Baltimore, Md.

May 2-5-Southwestern Public Service Association, Dallas, Texas.

May 6-12-Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

June 6-8-Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

July 8-12-Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

to demand an ever higher standard of service—the only check being higher fares. The major part of the discussion in the paper was directed toward indicating an answer to the question as to whether the tendency of the future is going to be toward a greater participation in transportation problems on the part of the city under the type of franchise in effect in Cleveland or result in a greater independence on the part of the street railway company. opinion of Mr. Ballou this question will be answered in no small measure by the additions to service which will have to be made at some future date in many communities to take care of the steadily expanding circle of suburban home de-

In presenting a résumé of the legis-lative situation at Washington, Leslie Vickers, Economist of the A.E.R.A., touched upon several matters of immediate concern to the electric railway industry. He explained that nothing was to be feared from a senatorial investigation of the utility industry except as such an investigation is allowed to degenerate into an effort to capitalize purely political aspects of the situation. A fair-minded, dispassionately scientific investigation of the industry's business can be viewed with equanimity ac-cording to Mr. Vickers. Continuing in his discussion of national legislative matters, he said that the Revenue Act which has already been passed in the House must needs be amended somewhat to include workable provisions for the rendering of returns on jointlycontrolled utility properties. He stated that the course of the bill regulating the operation of buses should be followed closely; that the bill as at present drawn commands the approval of all the parties concerned, including the Association of Railway & Utility Commissioners, the street railway companies, railroads, and both independent and railway associated bus companies. The opinion was expressed that the whole transportation act of 1920 needed revision to bring its provisions up to date. In concluding, Mr. Vickers outlined some of the things the national association is trying to accomplish for the electric railway industry at large and explained the functions of the New York and Washington offices of the organization as they concern contact with legislation and other matters of national scope. He pointed out the urgency for local units of the railway industry keeping their states' senators and repre-sentatives in Washington properly informed on the problems confronting them on their local properties. Only by this co-operative effort Mr. Vickers showed, could the headquarters' staff of the A.E.R.A. hope to accomplish worthwhile results in its own contacts in Washington.

Citing as results, attributed in part at least to the plan of building sales instinct in street railway men, the securing of fare increases on Texas railway properties of Stone & Webster without incurring unfavorable public reactions and likewise the cutting almost in half of accident costs, R. C. Forman of Stone & Webster outlined the training methods employed in making railway employees articulate through helping them to acquire the ability to talk intelligently about the company's affairs. He particularly emphasized the fact that the work in public speaking on Stone & Webster properties is not forced on the trainmen. The course of instruction in public speaking has been offered to manager and motorman alike in an effort to get every railway employee wholesomely informed on the affairs of the company for which he works; to make every trainman an intelligent, judicious company representative. Mr. Forman outlined the methods employed in conducting the public speaking instruction and stressed the existence of a real hunger on the part of every man for the ability to talk intelligently before a group of his fellows. In the conduct of the public speaking classes groups of about twenty men are handled at one time. Subject matter is subordinated to the development of the individual. Executives of the company who themselves have taken the course at an earlier date are called into meetings of the classes and address the men on subjects pertaining to their own departments. The department head then leaves the room and the subject of his informal talk is made the occasion for general discussions on the part of those taking the public speaking instruction. So far it has been observed that the men taking the course gain in self-confidence, evolve a keener loyalty to the company born of an understanding of its problems, and finally develop in a gratifying degree into able advocates of their company's policies. Mr. Forman stressed the fact that success of any such program of employee training is dependent upon a sympathetic and fair attitude on the part of the management.

Contrasting industrial conditions prevailing in the United States with those abroad M. B. Wootan, editor of Public Service magazine, Chicago, attacked government ownership of industries as essentially un-American, inefficient and uneconomic. He pointed out that the industrial supremacy of this country has depended not so much on our own vast resources of power as upon the retention and unhampered recognition of man's right in man's ideas. warned that to shackle individual initiative as professional propagandists would seem to be preaching, would be destructive to American principles and progress.

Lantern slides illustrating recently built electric railway cars, and an outline of their principle specifications were presented by C. L. Van Auken, managing editor of *Electric Traction*.

The place of the bus in urban transportation was the subject of an able paper presented by D. E. Druen of Kansas City Public Service Company. Mr. Druen's paper will appear in abstract in a later issue. It was unfortunate as Mr. Druen views it, that the bus made its debut to the street railway industry at a time when that industry was in an unreceptive frame of mind, because the "getting off on the wrong foot" has been a costly experience to both the railway industry and the bus manufacturer.

With T. J. Kelly of Fort Smith, Ark., as leader; S. E. Dillon, Hot Springs; R. B. Campbell, Wichita, Kan.; R. A. Leussler, Omaha, Neb.; F. G. Buffe, Kansas City; B. Hilburn, Tulsa, Okla.; C. J. Griffith, Little Rock, Ark.; J. L.

Adams, Denver, Colo.; D. L. Fennell, Kansas City, and others enlivened the luncheon devoted to a discussion of "Transportation Failures" with experiences obtained from operation of their respective properties.

In progress at the same time was a luncheon devoted to a consideration of "Mechanical Problems," W. J. Martin of Miami, Okla., presiding. Car delays from car failures and what several companies have done to reduce interruptions to service in handling them provoked considerable discussion. Mr. Crouse of the Westinghouse Electric & Manufacturing Company presented a short paper detailing some of the mechanical features of modern railway equipment.

The Bus in Urban Transportation*

By D. E. Druen Superintendent of Bus Maintenance, Kansas City Public Service Company, Konsas City, Mo.

automobile the riding public developed an entirely new conception of transportation. When a person moves about today this movement must be in accord with or partaking of the spirit, customs or activities of this age. Any agency of city transportation incapable of supplying these qualities, even though it offers safety, comfort and economy, can only hope for mediocre success in the field of city transportation.

The every day hazards to life and limb in city life have made the average citizen indifferent to giving any forethought to his safety. He seems to rely on his ability as a quick thinker and dodger to meet the emergency when it appears. While safety in transportation is an absolute essential as a sales argument, the value of its appeal is questionable.

Comfort in city transportation is being given considerable thought and attention today. I believe that comfort should be measured in terms of its distance from hardship rather than in its approach to luxury. The vast majority of passengers will be more concerned over the length of the time they must sit in a seat than with its luxury.

The well-known ability and willingness of the American public to pay for what it wants has just about shelved that old argument based on the big difference in cost between private and public transportation.

When considering buses it must be remembered that they are a product of this age and are rapidly becoming an intimate part of city life. The bus is a full blood relative of the private automobile and, as such, what is more reasonable than to expect it capable of exciting in its passengers reactions similar to those produced by the private automobile. The passenger will invariably leave the bus under the impression that he has traveled at a much higher speed than had he been on a street car,

*Abstract of a paper presented at a meeting of the Midwest Electric Railway Association. Hot Springs, Ark., Jan. 16-17, 1928.

WITH the advent of the private even though the time is identical. There exists a certain feeling of good-fellowship or intimacy between the bus driver and his passengers. He appreciates the driver's skill in handling through heavy traffic a piece of equipment many times larger than the private automobile. He gets a thrill out of seeing this driver beat the red light at the intersection. He has a feeling that his driver is making every effort to get him to his destination as quickly as possible. The bus passenger is also appreciative of the fact that the bus picks him up at the sidewalk and returns him there. It relieves him of the necessity of making a mad dash through traffic to reach a safety zone, and in winter he is not obliged to wade across gutters and streets filled with slush.

FARES MUST BE ADEQUATE

If the bus can furnish these two prime requisites of today's city transportation—reasonable comfort and high speed—the question naturally arises as to the value of what the rider should pay for this kind of service. The average fare now charged on bus operation throughout the country is not only inadequate but is not consistent with the value received, and bus operators will, undoubtedly, encounter some difficulty in establishing a proper and adequate bus fare until such a time as the existing street car fare is raised to a point where it properly belongs.

One thing should not be lost sight of and that is the necessity of avoiding the establishment of a fixed fare precedent. A fixed fare is not in keeping with the flexibility of bus operation and will surely work a hardship on both the

public and the operator.

Any collective effort in the matter of fares on the part of urban bus operators should at all times preserve to the individual property the right to adjust its fares to its particular conditions, and to all properties the right of a variable fare consistent with the nature of or class of service furnished.

In the matter of bus routes, an intelligent selection can be made only after a most exhaustive study. Where buses are routed through territory served by street cars bus routing should be such as to avoid as much as possible any close duplication of service. In substitution it is not necessary that the bus traverse the same route formerly traversed by the street cars. It should be permitted to take advantage of those features of topography and roadway that contribute to its best operation. Where community organizations and real estate developers demand bus routes in districts the available patronage of which will not support a route, it seems fair to make use of the trial method to obtain proof of the value of such a route. Under the trial method service is established for a certain test period and if at the end of that time the patronage has not been sufficient to support it, it is abandoned.

Other important features to be considered in selecting a route are conditions of pavement, facilities at the end of the route for turning or looping, and the traffic preference of the streets.

In the matter of pavement, statutes and ordinances providing for the assessment of costs of repairing and renewing pavement are in a more or less chaotic condition. The bus operator should be prepared to protect his interests if he would avoid that paving affliction with which the street railway industry has been burdened for so many years. The use of arterial highways by buses, when possible, offers a considerable advantage in that higher speeds may be maintained and there is also a considerable reduction in the collision hazard. There is another advantage by making use of streets or boulevards where snow removal is performed by city forces.

STANDARDIZED BUS MAINTENANCE

Just a few words on bus maintenance. A type of bus maintenance organization that seems to be meeting with considerable success patterns somewhat after the general practice followed by steam roads in the maintenance of locomotives. work conveniently divides itself into three general classes: inspection; running repairs; and back shop. Inspection crews are generally made up of one mechanic and a helper. These two men will work a bus from front bumper to tail light in one nine-hour day. They do very little repair work of any kind and no major repairs. Their chief duties are the checking of bearings, transmissions, differentials, brake riggings, engine adjustments, steering, etc. They are not called on to do any work about the garage other than this inspection. Buses are brought in for inspection on a predetermined mileage basis, varying on different properties from 2,500 to 4,000 miles.

The running repair crew make light inspections and repairs, being governed in their work largely by the operators' report cards turned in on the buses. The work of this crew is largely confined to night work in order to take advantage of having a majority of the equipment in the garage at one time.

The back shop does practically all of the repair work, such as overhauling engines, transmissions, rear ends, brake lining, drive lines, battery work, etc. These men do not work out on the floor. When inspection men find a defective part or a unit due for overhaul, they remove it from the bus, take it to the back shop and in exchange receive either a new or an overhauled unit as a replacement,

It is surprising to note the small amount of equipment required in a completely equipped back shop as compared to that found in a street car maintenance shop. This, in a measure, is because the widespread use in buses of high grade alloyed steels deprives the bus maintenance foreman of that general practice of the street car man of manufacturing so many of his own parts.

TREND OF BUS DESIGN

All of us in bus operation naturally are giving considerable thought as to what will constitute the ideal bus for city transportation. Unlike the street car, each succeeding year will see the development of a bus cheaper in first cost, maintenance and operating expense, improved in speed, riding qualities, and ease of handling. Present day bus construction is taking a trend toward these last named three qualities with an ever increasing simplicity in mechanical construction.

Do not let creep into the bus business that costly fallacy that has existed in the street car business which seems to demand a different type of street car for every city. Let the bus builder build your buses. Work with him but do not cramp his style by imposing on him restrictions born of a period in the past. Public demand will safely and surely pilot the evolution of the bus if you but give it the opportunity.

If you want to make a real contribution to the bus progress set up and follow an accounting system that will provide for the retirement and replacement of equipment on a short life basis as compared to the present life of a street car. This will have a tendency to lower first costs, stimulate improvement in design, and will at all times enable you to challenge the public with equipment suited to the demands of today.

Standard Steel Signs and Signals Recommended

AS A RESULT of a year's study by the American Engineering Council of the problem of a national system of standard street signs, signals and markings, the committee which had been engaged in this problem submitted recommendations based upon its findings. This work was carried on as the result of Council's participation in the National Conference on Street and Highway Safety. The fundamental data for the study were obtained from more than 100 of the principal cities of the country embracing a population of approximately 35,000,000.

The local work called into this public service nearly 400 engineers, safety men, and city officials, who were directly responsible for securing the data from the cities. The recommendations submitted proposed to establish a set of signs that will be recognized as standard throughout the country. Similarly, control of traffic through the automatic signal system was reported on, special reference being made to the type of signal, its location and the control best suited to the various city requirements.

Recommendations for markings, street car loading platforms and safety zones were also contained in the report.

Kentucky Association Elects

ABOUT 400 members of the Kentucky Association of Public Utilities attended the eleventh annual convention and banquet held at Louisville Jan. 18 and 19. The principal speakers at the dinner were the Hon. Edwin P. Morrow, Railway Wage Board, Washington, D. C., former Governor of Kentucky; and Lucius S. Storrs, managing director American Electric Railway Association. Ex-Governor Morrow in a humorous way touched on water power development in Kentucky, and expressed the hope that such resources would be developed to the greatest possible extent without robbing the state of scenic beauty. Public transportation was described by Mr. Storrs as the most important of all departments in the field of public utilities. Meddling of dema-gogues in the question of railway fares, he said, has often forced companies to operate at a loss and made it impossible to improve the service.

Officers elected for the coming year

are:

President, Samuel Riddle, vice-pres-ident Louisville Railway.

First vice-president, W. H. Harton, gen. mgr. Cincinnati, Newport & Covington Railway.

Second vice-president, L. B. Herrington, president Kentucky Utilities

Treasurer, A. A. Tuttle, vice-president, and treasurer, Kentucky Utilities Company.

Secretary, E. F. Kelley, secretary to the president Louisville Railway.

Mr. Riddle was advanced from first vice-president to president, and Mr. Harton was elected to the first vice-presidency, the other officers being reelected.

The new board of directors comprises the officers and the following:

T. B. Wilson, vice-president and general manager Louisville Gas & Electric Company; J. P. Barnes, president Louisville Railway; W. S. Cramer, vice-president and general manager Lexington Water Company; W. R. Power, general manager Kentucky & West Virginia Power Company; P. S. Pogue, Louisville Heating Company; J. P. Pope, vice-president and general manager Kentucky Traction & Terminal Company; H. J. Cochrane, president Maysville Water Company; N. C. Funk, Kentucky Power Co.

American Association News

Association Committees Appointed

C OMMITTEE lists of the American Association have now been completed. These include the chairmen and vice-chairmen of the convention committees for the next annual meeting and exhibit of the association to be held in Cleveland next September, although the full membership of these convention committees has not yet been announced. The list follows:

Advisory Council

В. С. Совв, vice-president Hodenpyl, Hardy & Company, New York., N. Y., chairman.

H. A. Blair, Chicago, Ill.

H. G. Bradlee, Boston, Mass.

N. F. Brady, New York, N. Y. M. C. Brush, New York, N. Y.

B. I. Budd, Chicago, Ill.

G. H. CLIFFORD, Boston, Mass.

F. R. Coates, New York, N. Y. S. M. Curwen, Philadelphia, Pa.

H. L. Doherty, New York, N. Y.

C. D. Emmons, Baltimore, Md. P. H. Gadsden, Philadelphia, Pa. C. E. Groesbeck, New York, N. Y.

EDWIN GRUHL, New York, N. Y. Samuel Insull, Chicago, Ill.

T. N. McCarter, Newark, N. J. S. Z. MITCHELL, New York, N. Y.

J. J. O'BRIEN, Chicago, Ill.
J. H. PARDEE, New York, N. Y.
H. HOBART PORTER, New York, N. Y.

A. W. Robertson, Pittsburgh, Pa.

J. N. SHANNAHAN, Omaha, Neb. Paul Shoup, San Francisco, Cal.

R. P. Stevens, New York, N. Y.

LUCIUS S. STORRS, New York, N. Y. A. W. THOMPSON, Philadelphia, Pa.

O. D. Young, New York, N. Y.

POLICY

J. P. BARNES, president Louisville Railway, Louisville, Ky., chairman. PAUL SHOUP, San Francisco, Cal.,

vice-chairman.

J. G. BARRY, Schenectady, N. Y. M. B. LAMBERT, New York, N. Y.

HARRY REID, New York, N. Y.

G. A. RICHARDSON, Chicago, Ill. J. N. SHANNAHAN, Omaha, Neb.

FINANCE

T. A. KENNEY, Hodenpyl, Hardy &

Co., New York, N. Y., chairman. C. R. Ellicott, New York, N. Y., vice-chairman.

F. W. Doolittle, New York, N. Y.

C. E. Morgan, Brooklyn, N. Y. E. P. Waller, Schenectady, N. Y.

SUBJECTS AND MEETINGS

F. R. Coates, president the Community Traction Company, c/o H. L. Doherty & Co., New York, N. Y., chairman.
J. P. Barnes, Louisville, Ky.

J. R. BLACKHALL, Highwood, Ill.

H. V. Bozell, New York, N. Y. C. A. Brooks, New York, N. Y. L. C. Bradley, Providence R. I.

R. F. Carbutt, New York, N. Y. H. C. Clark, Newark, N. J.

G. H. Clifford, Boston, Mass. L. J. DELAMARTER, Grand Rapids,

Mich.

Walter A. Draper, Cincinnati, Ohio. F. W. Doolittle, New York, N. Y. CHARLES GORDON, New York, N. Y. M. B. LAMBERT, New York, N. Y.

M. McCants, San Francisco, Cal. C. E. Morgan, Brooklyn, N.

L. H. PALMER, New York, N. Y. W. T. Rossell, Pittsburgh, Pa.

EDWARD A. WEST, Salt Lake City, Utah.

PUBLICITY

PAUL SHOUP, president Pacific Electric Railway, San Francisco, Cal., chairman.

BARRON COLLIER, New York, N. Y.,

vice-chairman.

F. L. Blanchard, New York, N. Y. F. G. Buffe, Kansas City, Mo.

W. H. Burke, Houston, Tex.

F. D. Burpee, Ottawa, Canada. Joe Carmichael, Des Moines, Iowa.

H. C. CLARK, Newark, N. J. H. O. CREWS, Chicago, Ill.

ROBERT DOUGAN, Washington, D. C. P. H. GADSDEN, Philadelphia, Pa.

L. E. Gould, Chicago, Ill. W. V. Hill, San Francisco, Cal.

W. H. HODGE, Chicago, Ill.

J. P. Ingle, Jacksonville, Tex.

R. J. Lockwood, St. Louis, Mo. Hal M. Lytle, Chicago, Ill.

J. C. McQuiston, E. Pittsburgh, Pa. MARTIN P. RICE, Schenectady, N. Y. J. S. S. RICHARDSON, New York, N. Y.

D. W. SNYDER, JR., Springfield, Ill. L. K. STARR, Atlanta, Ga.

W. P. STRANDBORG, Portland, Ore. A. C. Watt, New York, N. Y.

E. F. WICKWIRE, Mansfield, Ohio.

NATIONAL RELATIONS

J. H. HANNA, president Capital Traction Co., Washington, D. C., chairman. FRANK KARR, Los Angeles, Cal., vicechairman.

R. R. Bradley, Chicago, Ill.

A. W. Brady, Anderson, Ind.

C. D. Cass, Waterloo, Iowa.

G. H. CLIFFORD, Boston, Mass. G. H. HARRIES, Chicago, Ill.

Frank Silliman, Jr., New York,

D. W. SNYDER, JR., Springfield, Ill.

E. W. WAKELEE, Newark, N. J. B. F. WEADOCK, New York, N. Y. F. H. WILSON, Cleveland, Ohio.

DEPRECIATION

(Sub Committee of National Relations)

THOMAS CONWAY, JR., president Cincinnati, Hamilton & Dayton Railway, Philadelphia, Pa., chairman.

L. R. Nash, Boston, Mass., vicechairman.

F. W. DOOLITTLE, New York, N. Y.

M. W. Glover, Pittsburgh, Pa. C. R. HARTE, New Haven, Conn. A. S. Richey, Worcester, Mass. RICHARD SACHSE, Los Angeles, Cal. C. E. THOMPSON, Chicago, Ill. J. H. HANNA, Washington, D. C., ex officio.

Publications

J. H. HANNA, president Capital Trac-

tion Co., Washington, D. C., chairman. H. V. Bozell, New York, N. Y., vicechairman on Aera.

F. W. Doolittle, New York, N. Y., vice-chairman on statistics.

J. L. Alexander, Houston, Tex.

G. B. Anderson, Los Angeles, Cal. T. W. Casey, New York, N. Y.

CHARLES GORDON, New York, N. Y. T. R. LANGAN, New York, N. Y. H. H. NORRIS, BOSTON, Mass.

A. S. RICHEY, Worcester, Mass.

W. H. SAWYER, New York, N. Y. R. S. Tompkins, Baltimore, Md.

E. P. WALLER, Schenectady, N. Y.

MEMBERSHIP

C. E. Morgan, vice-president and general manager Brooklyn City Rail-

road, Brooklyn, N. Y., chairman. T. W. Casey, New York, N. Y., vice-

chairman.

J. H. ALEXANDER, Cleveland, Ohio. G. B. ANDERSON, Los Angeles, Cal.

T. A. ASPELL, Akron, Ohio

J. D. Augustus, Louisville, Ky. J. M. Bamberger, Salt Lake City,

Utah.

D. E. Batesole, Stamford, Conn. C. P. Billings, New York, N. Y.

J. R. BLACKHALL, Highwood, Ill.

D. E. Blair, Montreal, Canada.

A. C. BLINN, Akron, Ohio. A. J. BOARDMAN, Boston, Mass.

RAY Boiselle, Boston, Mass.

W. H. BOYCE, Pittsburgh, Pa.

M. R. BOYLAN, Newark, N. J. C. A. Brooks, New York, N. Y.

C. P. Brown, Fargo, N. D.

W. M. Brown, Seattle, Wash. F. G. Buffe, Kansas City, Mo. W. H. Burke, Houston, Tex.

F. D. Burpee, Ottawa, Canada. F. L. Butler, Atlanta, Ga.

R. B. CAMPBELL, Wichita, Kan.

C. C. CASTLE, New York, N. Y. F. C. CHAMBERS, Des Moines, Ia. C. M. CHENEY, Waterloo, Iowa.

H. B. Cobban, Miami, Okla.

G. E. Cockings, Bristol, Conn. R. C. Coffy, Fort Smith, Ark.

STUART COOPER, Charleston, S. C.

F. A. CORNELL, Detroit, Mich. S. J. Cotsworth, Philadelphia, Pa.

H. D. Crampton, Dallas, Tex.

H. N. CRANDALL, Presque Isle, Me.

C. F. CRANE, Harrisburg, Pa. J. B. Crawford, Concord, N. H.

F. B. Culley, Augusta, Ga. S. M. Curwen, Philadelphia, Pa.

C. H. Dahl, Brooklyn, N. Y

F. P. D'ARCY, Kalamazoo, Mich. J. V. Davis, Washington, D. C. L. J. DELAMARTER, Grand Rapids,

Mich. V. N. DeLamater, Newark, N. J.

B. J. DENMAN, Chicago, Ill.

H. F. DICKE, Allentown, Pa. HAROLD Down, Waterbury, Conn.

J. J. Doyle, Baltimore, Md. W. A. Draper, Cincinnati, Ohio. C. R. Ellicott, New York, N. Y. HARRISON EMHARDT, Washington, D. C. B. J. Fallon, Chicago, Ill. T. A. Ferneding, Dayton, Ohio. A. H. FERRANDOU, Detroit, Mich. THOMAS FINIGAN, Chicago, Ill. J. R. FITZPATRICK, Chicago, Ill. H. B. FLOWERS, New Orleans, La. B. W. FRAUENTHAL, St. Louis, Mo. H. L. Geisse, Wausau, Wis. C. F. Gilbert, St. Louis, Mo. W. S. Godwin, Baltimore, Md. F. D. GORDON, Portland, Me. L. O. GORDON, New York, N. Y. L. E. Gould, Chicago, Ill. F. O. GRAYSON, St. LOUIS, Mo. C. J. GRIFFITH, Little Rock, Ark. E. H. HAMMOND, Phillipsdale, R. I. T. J. Hanlon, Jr., Tampa, Fla. W. H. HARTON, Covington, Ky. C. H. HARVEY, Knoxville, Tenn. D. W. HARVEY, Toronto, Canada. C. S. HAWLEY, Albany, N. Y. H. B. HEARN, Shreveport, La. E. R. Heiny, Lincoln, Neb. B. Hilburn, Tulsa, Okla. W. V. Hill, San Francisco, Cal. E. F. Hodgkins, Gardner, Me. W. W. Holden, San Antonio, Tex. W. W. Horwood, Montreal, Canada. RAYMOND HUNT, Wilmington, N. C. J. P. INGLE, Jacksonville, Fla. J. R. Jeffrey, Milwaukee, Wis. A. P. Jenks, Chicago, Ill. RANKIN JOHNSON, Trenton, N. J. A. L. KASEMEIER, Winton Place, Ohio. George Keegan, New York, N. Y. G. L. KIPPENBERGER, St. Louis, Mo. E. S. Knisely, Bethlehem, Pa. E. J. LANG, Cleveland, Ohio. R. A. LEUSSLER, Omaha, Neb. R. L. LINDSEY, Durham, N. C M. McCants, San Francisco, Cal. J. H. McClure, Dayton, Ohio. C. J. McCormick, New York, N. Y. E. F. McKay, Oklahoma City, Okla. W. J. McKee, Worcester, Mass. A. D. McWhorter, Memphis, Tenn. G. L. Maltby, Jamestown, N. Y. W. A. MAYNARD, Cleveland, Ohio. RICHARD MERIWETHER, Dallas, Tex. G. R. MILLICAN, Evansville, Ind. Dudley Montgomery, Madison, Wis. P. H. Mulcahy, Ogden Utah. C. P. NACHOD, Louisville, Ky. M. N. Newell, Richmond, Va. H. H. Norris, Boston, Mass. W. N. Osburn, Cleveland, Ohio. H. A. Oswald, Stratford, Canada. L. H. PALMER, New York, N. Y. A. M. PATTEN, Topeka, Kan. J. P. Pope, Lexington, Ky. C. D. Porter, Hampton, Va. A. E. Potter, Providence, R. I. H. B. POTTER, Baltimore, Md. A. E. Pratt, Parlin, N. J. J. P. Pulliam, Milwaukee, Wis. J. K. Punderford, New Haven, Conn. J. A. QUEENEY, Philadelphia, Pa. H. W. RENICK, Los Angeles, Cal. A. E. REYNOLDS, Springfield, Mo. A. L. REYNOLDS, Miami, Fla. A. S. Richey, Worcester, Mass. SAMUEL RIDDLE, Louisville, Kv.

M. F. RILEY, Hagerstown, Md. A. M. Robertson, Minneapolis, Minn. H. S. Robertson, Denver, Colo. E. A. Ross, Lafayette, Ind. J. E. E. ROYER, Spokane, Wash. W. H. SAWYER, New York, N. Y. C. F. SCHMIDT, Indianapolis, Ind. S. H. SERENA, Tompkinsville, N. Y. C. M. SHARPE, Washington, D. C. H. J. SHEERAN, New York, N. Y. K. A. SIMMON, East Pittsburgh, Pa. E. B. SMITH, New York, N. Y. J. B. Sмітн, Manchester, N. H. R. R. SMITH, South Bend, Ind. D. W. SNYDER, JR., Springfield, Ill. W. F. STANTON, Rochester, N. Y. F. Stockwell, Cambridge, Mass. W. P. STRANDBORG, Portland, Ore. R. F. STUBBLEBINE, New York, N. Y. RICHARD SULLIVAN, Tacoma, Wash. J. V. Sullivan, Chicago, Ill. ALFRED SWEENEY, Lewiston, Me. A. TAURMAN, Birmingham, Ala. Perley A. Thomas, High Point, W. E. THOMPSON, New York, N. Y. P. A. TILLERY, Raleigh, N. C. R. I. Topp, Indianapolis, Ind. C. L. VAN AUKEN, Chicago, Ill. J. H. VANDERVEER, New York, N. Y. E. P. WALLER, Schenectady, N. Y. HERBERT WARREN, Duluth, Minn. S. B. Way, Milwaukee, Wis. H. B. Weatherwax, Albany, N. Y. E. A. WEST, Salt Lake City, Utah. H. R. WHITNEY, Worcester, Mass. A. Williford, Cleveland, Ohio. T. W. Wilson, Wilmington, Del. C. H. Wondries, South Bend, Ind. W. E. Wood, Richmond, Va. P. W. Wood, New Orleans, La. J. B. Woolum, Jackson, Miss. L. M. ZAPP, Detroit, Mich. Specific Assignments (Sub-committee of the membership

(Sub-committee of the membership committee).

B. I. Budd, president Chicago Rapid Transit Co., Chicago, Ill., chairman.

C. D. Cass, Waterloo, Iowa.
A. H. Ehle, Philadelphia, Pa.
C. R. Ellicott, New York, N. Y.
C. D. Emmons, Baltimore, Md.
P. H. Gadsden, Philadelphia, Pa.
C. B. Keyes, New York, N. Y.
M. B. Lambert, New York, N. Y.
L. H. Palmer, New York, N. Y.
J. N. Shannahan, Omaha, Neb.
Paul Shoup, San Francisco, Cal.

CHARLES A. COFFIN FOUNDATION PRIZE

R. P. Stevens, president Penn-Ohio Edison Co., New York, N. Y., chairman.
J. P. Barnes, Louisville, Ky.
J. H. McGraw, New York, N. V.

J. H. McGraw, New York, N. Y.

CONVENTION COMMITTEES CONTRACT (SUB-COMMITTEE)

Frank R. Coates, Henry L. Doherty & Co., New York, N. Y., chairman.

EXHIBIT

JOSEPH H. ALEXANDER, President Cleveland Ry., Cleveland, Ohio, chairman.

L. W. SHUGG, Schenectady, N. Y., vice-chairman.

ENTERTAINMENT

C. S. MacCalla, vice-president and general manager Pennsylvania-Ohio Edison Company, Youngstown, Ohio, chairman.

J. C. McQuiston, East Pittsburgh, Pa., vice-chairman.

HOTEL

PAUL E. WILSON, vice-president Cleveland Railway, Cleveland, Ohio. chairman.

E. J. Speh, Cleveland, Ohio, vice-chairman.

TRANSPORTATION

E. C. Faber, vice-president Barron G. Collier, Inc., New York, N. Y., chairman.

COOPERATION WITH MANUFACTURERS

E. F. Wickwire, vice-president Ohio Brass Co., Mansfield, Ohio, chairman. Martin Ackerman, Dayton, Ohio David Beecroft, New York, N. Y. W. A. Blume, Detroit, Mich. W. H. Boyce, Pittsburgh, Pa. T. W. Casey, New York, N. Y. L. J. Delamarter, Grand Rapids, Mich. G. E. Doke, Chicago, Ill. W. H. Dowle, New York, N. Y. H. B. Doyle, New York, N. Y.

Walter Drey, New York, N. Y.
E. C. Faber, New York, N. Y.
A. H. Ferrandou, Detroit, Mich.
George Frey, Philadelphia, Pa.
Charles Gordon, New York, N. Y.
L. E. Gould, Chicago, Ill.
C. L. Hancock, New York, N. Y.
R. F. Hayes, New York, N. Y.
W. V. Hill, San Francisco, Cal.
R. R. Holden, Chicago, Ill.
A. P. Jenks, Chicago, Ill.
H. J. Kenfield, Chicago, Ill.
H. B. Kirkland, Chicago, Ill.
M. B. Lambert, New York, N. Y.
C. M. McCorport, Philadelphia Po

C. M. McCreery, Philadelphia, Pa. J. N. McDonald, New York, N. Y. J. J. McMahon, New York, N. Y. E. B. Meissner, St. Louis, Mo. J. D. Porter, Pittsburgh, Pa. S. P. Seward, Cleveland, Ohio L. F. Stoll, New York, N. Y. E. P. Waller, Schenectady, N. Y. G. W. Welsh, East St. Louis, Ill. J. M. Yount, San Francisco, Cal.

COOPERATION WITH MOTOR VEHICLE INDUSTRY

Lucius S. Storrs, managing director American Electric Railway Association, New York, N. Y., chairman.

A. W. Brady, Anderson, Ind. C. D. Emmons, Baltimore, Md. M. B. Lambert, New York, N. Y. E. W. Wakelee, Newark, N. J.

COOPERATION WITH STATE AND SECTIONAL ASSOCIATIONS

T. A. Kenney, Hodenpyl, Hardy & Co., New York, N. Y., chairman. F. G. Buffe, Kansas City, Mo. W. A. Draper, Cincinnati, Ohio R. B. Stearns, Boston, Mass. J. P. Pulliam, Milwaukee, Wis. W. B. Tuttle, San Antonio, Tex.

EDUCATION

EDWARD DANA, general manager Boston Elevated Railway, Boston, Mass. chairman.

J. S. HYATT, Chicago, Ill., vice-chair-

man.

L. P. BAURHENN, Newark, N. J. A. C. BLINN, Akron, Ohio W. H. BURKE, Houston, Tex. J. A. Dewhurst, New York, N. Y. Н. Н. Fenton, Pittsburgh, Pa. M. B. LAMBERT, New York, N. Y. M. McCants, San Francisco, Cal. F. H. MILLER, Louisville, Ky. H. H. Norris, Boston, Mass. H. B. Potter, Baltimore, Md. A. J. ROWLAND, Milwaukee, Wis. A. J. SARRE, New Orleans, La. C. D. SMITH, Cleveland, Ohio

ELECTRIC RAILWAY FINANCE 1928

L. C. Bradley, president Rhode Island Public Service Company, Providence R. I., chairman.

J. G. Barry, Schenectady, N. Y. J. C. BENNETT, New York, N. Y. G. H. CLIFFORD, Boston, Mass. S. M. CURWEN, Philadelphia, Pa. G. E. Fraser, Chicago, Ill. HARRY REID, New York, N. Y P. W. Winslow, New York, N. Y. P. S. Young, Newark, N. J.

EMPLOYE-CUSTOMER CONTACT

THOMAS FITZGERALD, vice-president Pittsburgh Railways, Pittsburgh, Pa., chairman.

D. W. GORDON, Chicago, Ill. C. D. SMITH, Cleveland, Ohio D. W. SNYDER, JR., Springfield, Ill. C. E. THORNEY, Chicago, Ill. W. E. Wood, Richmond, Va.

INDUSTRIAL RELATIONS

H. ALEXANDER, president Cleveland Railway, Cleveland, Ohio, chair-

THOMAS FITZGERALD, Pittsburgh, Pa., vice chairman.

J. P. BARNES, Louisville, Ky. S. B. WAY, Milwaukee, Wis. W. E. Woop, Richmond, Va.

INSURANCE

H. B. POTTER, general manager United Railways & Electric Company, Baltimore, Md., chairman.

A. Benham, Cincinnati, Chio. O. H. Bernd, Des Moines, Iowa G. H. BOURNE, New York. N. Y. F. L. BUTLER, Atlanta, Ga. R. S. CHILDS, New York, N. Y. STANLEY CLARKE, St. Louis, Mo. N. H. Daniels, Boston, Mass. F. M. Hamilton, Chicago, Ill. A. D. Knox, New Haven, Conn. J. H. Moran, Boston, Mass. F. J. Petura, New York, N. Y. D. W. Pontius, Los Angeles, Cal. J. P. PULLIAM, Milwaukee, Wis. H. M. SHAW, Springfield, Ill. B. L. Tomes, Philadelphia, Pa. P. E. Wilson, Cleveland, Ohio

Motor Bus Depreciation

L. H. PALMER, vice-president and general manager Fifth Avenue Coach Company, New York, N. Y., chairman.

R. H. PINKLEY, Milwaukee, Wis., vice-chairman.

C. H. Forsgard, Toledo, Ohio M. W. Glover, Pittsburgh, Pa. F. C. HORNER, New York, N. Y. H. A. Johnson, Chicago, Ill. I. A. May, New Haven, Conn. G. H. SCRAGG, New York, N. Y.

MOTOR VEHICLE INFORMATION

J. H. ALEXANDER, president Cleveland Railway, Cleveland, Ohio, chair-

D. W. Pontius, Los Angeles, Cal., vice-chairman.

M. R. BOYLAN, Newark, N. J. L. C. Bradley, Providence, R. I. F. G. Buffe, Kansas City, Mo. F. L. BUTLER, Atlanta, Ga. F. A. CUMMINGS, Boston, Mass. B. J. FALLON, Chicago, Ill. H. B. FLOWERS, New Orleans, La. M. B. Lambert, New York, N. Y. R. L. Lindsey, Durham, N. C. W. H. Lines, Portland, Ore. H. B. POTTER, Baltimore, Md. R. I. TODD, Indianapolis, Ind. W. B. TUTTLE, San Antonio, Tex. E. P. WALLER, Schenectady, N. Y. S. B. WAY, Milwaukee, Wis. W. E. Wood, Richmond, Va.

PUBLIC SPEAKING .

B. I. Budd, president Chicago Rapid Transit Co. and Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., ·chairman.

H. M. Lytle, Chicago, Ill., vice chair-

man.

P. S. Arkwright, Atlanta, Ga. J. P. Barnes, Louisville, Ky. H. M. Blain, New Orleans, La. F. J. Bollmeyer, Cleveland, Ohio F. G. Buffe, Kansas City, Mo. R. F. CARBUTT, New York, N. Y. F. C. CHAMBERS, Des Moines, Iowa ALFRED FISCHER, New York, N. Y. THOMAS FITZGERALD, Pittsburgh, Pa. H. B. FLOWERS, New Orleans, La. P. H. GADSDEN, Philadelphia, Pa. E. W. Hodges, New York, N. Y. M. B. LAMBERT, New York, N. Y.

G. E. Lewis, Denver, Col. S. T. MacQuarrie, Boston, Mass. J. H. McGraw, New York, N. Y. J. C. McQuiston, East Pittsburgh,

D. W. Pontius, Los Angeles, Cal. J. P. Pulliam, Milwaukee, Wis. J. S. S. RICHARDSON, New York, N. Y.

J. B. SHERIDAN, St. Louis, Mo. R. B. STEARNS, Boston, Mass. E. A. West, Salt Lake City, Utah G. WILLARD, New Haven, Conn. W. E. Wood, Richmond, Va.

RAPID TRANSIT

G. A. Richardson, vice-president and general manager Chicago Surface Lines, Chicago, Ill., chairman.
J. H. ALEXANDER, Cleveland, Ohio,

vice chairman.

H. L. Andrews, Schenectady, N. Y. W. B. Bennett, St. Louis, Mo. Edward Dana, Boston, Mass. H. E. EHLERS, Philadelphia, Pa.

S. E. Emmons, Baltimore, Md. B. J. Fallon, Chicago, Ill. THOMAS FITZGERALD, Pittsburgh, Pa. E. J. McIlraith, Chicago, Ill. R. F. Kelker, Jr., Chicago, Ill. W. S. Menden, Brooklyn, N. Y. D. W. Pontius, Los Angeles, Cal. C. E. SMITH, New Haven, Conn. F. H. SHEPARD, New York, N. Y. J. B. Stewart, Jr., Springfield, Ill. D. L. TURNER, New York, N. Y. JAMES WALKER, Chicago, Ill.

STREET TRAFFIC AND MASS Transportation

G. A. RICHARDSON, vice-president and general manager Chicago Surface Lines, Chicago, Ill., chairman.

J. H. M. Andrews, Philadelphia, Pa. J. A. Beeler, New York, N. Y. J. R. Bibbins, Washington, D. C. M. R. Boylan, Newark, N. J. EDWARD DANA, Boston, Mass. S. E. Emmons, Baltimore, Md. E. P. Goodrich, New York, N. Y. R. F. Kelker, Jr., Chicago, Ill. MILLER McCLINTOCK, Cambridge,

Mass. E. J. McIlraith, Chicago, Ill.

L. H. PALMER, New York, N. Y. C. E. Smith, New Haven, Conn.

TAXATION

W. A. JACKSON, vice-president Milwaukee Electric Railway & Light Company, Milwaukee, Wis., chairman,

C. H. Allen, Chicago, Ill. G. G. Brownell, New York, N. Y. H. A. CLARK, San Diego, Cal. A. T. Davidson, New York, N. Y. R. M. FEUSTEL, Fort Wayne, Ind. H. L. GEISSE, Wausau, Wis. J. P. Griffin, Dallas, Tex. D. J. Hennessey, Pittsburgh, Pa. L. R. Nash, Boston, Mass. D. J. Strouse, Minneapolis, Minn. J. L. Swope, Baltimore, Md. E. W. Wakelee, Newark, N. J.

Representatives of the association on other national organizations.

U. S. CHAMBER OF COMMERCE

J. N. SHANNAHAN, president Omalia Council Bluffs Street Railway, Omaha, Neb., national councillor.

J. H. Hanna, president Capital Traction Company, Washington, D. C., substitute national councillor.

Conference on Street and HIGHWAY SAFETY

J. P. Barnes, president Louisville Railway, Louisville, Ky., chairman.

L. H. PALMER, vice-president and general manager Fifth Avenue Coach Company, New York, N. Y., vice-chairman.

NATIONAL SAFETY COUNCIL

R. W. EMERSON, vice-president and general manager Cleveland Railway, Cleveland, Ohio, representative.

THOMAS FITZGERALD, vice-president Pittsburgh Railways, Pittsburgh, Pa.,

alternate.

NATIONAL INDUSTRIAL CONFERENCE BOARD

F. R. Coates, Henry L. Doherty & Company, New York, N. Y., representative.

Lucius S. Storrs, managing director American Electric Railway Association, New York, N. Y., representative.

JOINT COMMITTEE OF THE NATIONAL . Utility Associations

H. G. Bradlee, Boston, Mass.

B. I. Budd, Chicago, Ill.

F. R. COATES, New York, N. Y. B. C. COBB, New York, N. Y. T. N. McCARTER, Newark, N. J.

A. W. Robertson, Pittsburgh, Pa.

R. P. Stevens, New York, N. Y. L. S. Storrs, New York, N. Y.

R. I. Todd, Indianapolis, Ind.

E. W. WAKELEE, Newark, N. J., alternate.

AMERICAN COMMITTEE ON INDUCTIVE Co-ordination

W. H. SAWYER, president Stevens & Wood, Inc., New York, N. Y., chairman. A. H. Armstrong, Schenectady, N. Y., representative.

L. T. Robinson, Schenectady, N. Y., alternate.

C. R. HARTE, New Haven, Conn., representative.

JOHN LEISENRING, Springfield, Ill., alternate.

C. A. Brooks, New York, N. Y., representative and alternate for W. H. Sawyer.

R. G. Winans, New York, N. Y.,

alternate.

G. C. HECKER, New York, N. Y., representative and secretary of entire committee.

J. W. Welsh, New York, N. Y., alternate.

W. R. STINEMETZ, East Pittsburgh, Pa., representative.

R. D. Evans, East Pittsburgh, Pa., alternate.

Rolling Stock Special Committee No. 3

DISCUSSION of the conditions under which the tests of various drives would be conducted at the Bureau of Standards in Washington took up the time of the sub-committee on tests at a meeting held at Chicago, Ill., on Jan. 12. Those present were H. H. Adams, chairman; C. A. Burleson, W. J. Clardy, A. L. Kasemeier and G. L. Kippenberger.

Due to construction requirements of some of the drives it was found impossible to separate the losses sustained in the gearing from those sustained in the accompanying substitutes for the journal bearings used in ordinary street car equipment. It would require that in these tests the efficiency would have to be determined as over-all efficiency from motor connection to wheel rim. On this account it was decided that if possible all units should be tested under these same conditions and the efficiency determined on that basis.

Lubrication of the units during test was discussed, and it was decided that in

order to secure efficiency figures on the various types of units as operating under service conditions as nearly as possible, that it would be advisable to use the lubrication appropriate to the specific type of unit as actually in service.

As some of the units are equipped with anti-friction bearings in place of the plain standard journal bearings, it was felt that this test should also determine if possible the effect of this type of bearing on the efficiency of these units. It was felt that one type of unit equipped with anti-friction journal bearings would be sufficient, as the proportionate gain in efficiency secured by the use of this bearing could be taken into consideration when discussing the efficiency of any other type of unit if it should be equipped with anti-friction journal bearings.

On this basis it was then determined that the following types of drives would be required for tests at Washington:

1. One truck equipped with two W-N double reduction drive units, one unit to be equipped with plain journal bearings and the other to be equipped with anti-friction journal bearings.

2. One truck equipped with two units consisting of one Cincinnati Car Company type of worm-drive unit and one single reduction spur gear drive of the Tool Steel Gear & Pinion Company.

3. One truck of two units each equipped with one St. Louis Car Company type of worm-drive unit and one axle prepared for use with the standard single reduction motor drive as it is now being used.

4. One unit of the Timken-Detroit Axle Company's type of worm drive.

5. One unit of the Eaton Spring & Axle Company type of double reduction drive.

The General Electric Company agreed to furnish if necessary a GE-265 motor for use with the single reduction spur gearing unit of truck C, and also a GE-1126 600-volt 35-hp. automotive type motor for use at the Bureau of Standards. The Westinghouse Electric & Manufacturing Company agreed to furnish if necessary a No. 1425 600-volt 35-hp. automotive type motor, or a V-91 300-volt 28-hp. type of motor for use at the Bureau of Standards. They also agreed to furnish a series of drawings showing set-ups under which these units might be tested and have them ready if possible for the next committee meeting.

W. & S. Special Committee No. 7

SPECIAL committee No. 7 of the way and structures division of the Engineering Association, appointed to study the possibilities of the use of alloy steels other than manganese in special trackwork, held a meeting in Philadelphia on Jan. 11.

The meeting was attended by the following members: A. T. Spencer, chairman; W. G. Hulbert representing J. H. Hall, F. G. Hibbard, P. A. Kerwin, R. H. Noderer, O. C. Rehfuss and N. E. Salsich. J. F. Rodgers and Mr. Raiguel of the P.R.T. were also present.

Last year's work was reviewed and

arrangements made to follow the experience gained from existing installations and report. Offers were accepted from committee members to make road experiments with welds made on artificially broken corners on new chromenickel and manganèse steel pieces. Tentative arrangements were also made be gin laboratory experiments to determine, if possible, the comparative weldability of these two metals.

Following the business meeting, the committee, under the guidance of John F. Rodgers, of the Philadelphia Rapid Transit Company, inspected a number of special trackwork layouts of chrome-

nickel steel.

Association Reports in Preparation

SPECIAL reports being prepared by the Bureau of Information and Service of the American Electric Railway Association are listed below. They will be available to member companies on request:

Bulletin No. 178.-Motor Bus Legislation in 1927-Contains complete copies of all motor bus regulatory legislation passed during the year 1927 with a carefully prepared analytical index permitting ready reference to any section of the new laws. This bulletin supplements Bulletin No. 120, State Regulation of Motor Bus Common Carriers, issued Jan. 1, 1927, and covers all legislation enacted since the date of that bulletin.

Bulletin No. 179.—Electric Railway -Gives a list of the new securi-Financingties issued by electric railways in 1927, showing the type of security, the amount issued, the interest rate and the offering price. The bulletin also contains a summary of securities defaulted, retired or refunded during the year, the amounts of securities outstanding of companies abandoning service during the year and a sum-mary of the net effect of these new issues and retirements on the capitalization of the industry

Bulletin No. 180.—Daily, Weekly and Monthly Pass and Identification Card— Contains a list of companies using the various forms of the pass or identification card idea with the reasons for adopting it and a summary of the results obtained and the opinions of operators as to their advantages and disadvantages. It also gives a list of companies which have experimented with and discontinued the use of the pass or the identification card, together

with a summary of their results and the reasons for the discontinuance.

Bulletin No. 181.—Trend of Material Prices—A new edition of the Association's regular bulletin on relative costs of materials, bringing down to date the trend of prices of materials used by electric railways based on data contributed by the manufacturers of such material.

In addition to the above the following supplements have been prepared, bringing the information they cover down to date:

Supplement No. 3 to Bulletins Nos. 163 and 164, Electric Railway Fares.
Supplement No. 4 to Bulletin No. 160,

Wages of Trainmen. Supplement No. 4 to Bulletin No. 161, Wages of Bus Men.
Cost of Living Studies (Bulletin No.

182).

News of the Industry

Hearings on Public Control

Committee of Massachusetts Legislature takes up question of future of Boston "L"

PUBLIC hearings were begun this week before two committees of the Massachusetts Legislature on the various bills pertaining to the future treatment of the Boston Elevated Railway. It was brought out at the opening hearing that the trustees of the Boston Elevated favor the proposition from the Metropolitan Planning Division to extend the public control fifteen years, and also favor the proposed extensions of the subway lines at a cost of \$35,-

000,000 to \$40,000,000.

H. Ware Barnum spoke for the Board of Trustees, as its counsel. He said that the trustees did not directly indorse at this time the proposed extension to Malden Square, because it has not given the matter sufficient study. The trustees differed from the Planning Division in one important detail on the division of cost. The trustees feel that the car riders should be required to pay only one-third, while the Planning Division proposed that they should pay one-half. The amounts that do not come out of fares should be raised by betterment assessments or certain forms of taxation.

Assessment for Betterments Held to Be Legal

The Supreme Court has ruled that assessment of betterment in the district traversed by the rapid transit line is legal, and Mr. Barnum showed how real estate values have gone up by citing one example on the Dorchester extension. There the Elevated before the extension bought a key piece of land for 25 cents a foot which now has a value of \$1.50 a foot. It is only fair that land thus benefitted should pay a part of the cost of the rapid transit lines.

While sentiment is strong for continued public control of the Elevated, still it became clear also that there is an element in the Legislature which will fight for immediate public ownership of the road. The hearings will continue, according to Senate Chairman Warren, so long as the public desires to discuss the matter before the committee.

One of the problems coming under discussion now is what is to become of the company at the end of 40 years when the bonds to be issued in connection with service extensions will mature; whether the state has not by that time acquired a property right which establishes a form of state ownership and therefore commits the state to public ownership.

Another issue raised is whether the stockholders of the Elevated can be made to accept the proposed legislation

and to carry out the \$40,000,000 extension projects which are promised. The present answer to this is that there are two parties to the contract and the rights of the Elevated stockholders to accept or reject any new contract offered by the Legislature must be respected.

Final Hearing on Walsh Resolution Set for Jan. 30

Conclusion of hearings on the Walsh public utilities resolution was definitely set for Jan. 26, and consideration in committee scheduled for Jan. 30, by the Chairman, Senator Watson, of Indiana, following the Jan. 25 session of the Senate Committee on Interstate Commerce.

The only witness heard on Jan. 25 was the chairman, James Emery, of the National Association of Manufacturers. Mr. Emery concluded his statement of the preceding day, and was questioned by members of the committee. The only remaining witness is the chairman, W. B. Ainey, of the Pennsylvania Public

Service Commission.

Former Senator Irvine L. Lenroot, counsel for the Joint Committee of National Utility Associations, announced that he might call upon W. L. Ransom, New York attorney, who helped prepare the joint committee's brief, to make a final statement. Senator Walsh of Montana, author of the resolution proposing an inquiry by a special Senate committee into the gas and electric industries, stated that he would require no more than a half hour to conclude his presentation.

Senator Watson stated orally, following the hearing, that the procedure he has outlined had been fixed upon in order to give members of the committee and the Senate time to read the record of the hearings. He said he could not say whether a committee report could be expected after the Jan. 30 session. He said:

This is a highly important matter, and we cannot act too hastily. We will give all interested parties until next Monday to read the record, and then take up the resolution in executive session. We hope to finish shortly, but cannot tell.

Endless Chain Plan Reappears in Des Moines

Officials of the Des Moines City Railway, Des Moines, Ia., have found it necessary to warn the public against a company which was reported to be selling the regular weekly pass on the endless chain plan. Otto H. Bernd, secretary of the railway, stated that the plan was similar to the one used in many localities to dispose of merchan-

dise. The first purchaser paid in 25 cents and received a card with slots for six more 25-cent pieces. When six friends had paid 25 cents each the original customer got a pass worth \$1.25. Then they in turn started out to repeat on their friends. Mr. Bernd estimated that by the time the fifth cycle was reached, it would require nearly 50,000 persons, whereas, the largest sale of passes ever recorded here was 13,000.

Hearings on Oakland's Fare

Ten-cent fare petition in Californian city put over until March. Company opposed to commission's zone order

AFTER a two-day hearing. State Railroad Commissioner Clyde Seavey adjourned the zone rate case of the Key System Transit Company, Oakland, Calif., until March 6. Pressing their demand for a 10-cent fare and \$1 weekly passes, officials of the company on the first day of the hearing, Jan. 24, in Oakland City Hall, declared that the commission's 5-cent zone fare order would result in a loss of \$1,078,666-annually.

Richard Sachse, noted consulting engineer, chief witness for the company, stated that of this loss \$1,003,811 would be in the traction division and \$73,855 in the ferry division. Citing Seattle, it was shown that during 1923, when the rate in that city was reduced from 10 cents to 5 cents for 107 days, there was a resultant loss of \$1,790,000 based on an annual computation. Mr. Sachse also said that when fares in Chicago were reduced from 8 cents to 7 cents it required five years for the street railroads to recover from the loss.

Vice-President C. C. Vargas, of the Key System, testified that the company was operating at a loss under the present 7-cent fare, and H. P. Bell, chief engineer, claimed that the system's income was insufficient to meet maintenance and new equipment needs.

A battle over a bulletin published by the American Electric Railway Association developed on the second day of the hearing. The bulletin had to do with the resultant traffic on street-car lines in ten cities following rate reductions. H. E. Mott, chief engineer of the California Railroad Commission and author of the 5-cent zone plan for the East Bay, urged Herman Phleger, chief counsel for the Key, to introduce the bulletin as evidence. Mr. Phleger refused, citing the danger of misinterpretation, and Mr. Mott said he could not introduce it because it had been given him in confidence. Assistant Attorney John Collier, of Oakland, asked Commissioner Seavey to order

the bulletin produced. Mr. Phleger objected but agreed to the admission of the document by the consent of the association or by any of the cities involved.

Cross-examined by Assistant Attorney Collier, Mr. Sachse admitted that the combined traffic of the Market Stre and municipal railways in San Francisco, which operate under a 5-cent fare, showed an increase in 1927 passenger traffic. The Market Street lines show a falling off of 0.7 per cent, whereas the municipal lines gained 1.507 per cent.

Officials of all East Bay cities were represented at the hearing to oppose the Key System's 10-cent fare demand.

\$13,000,000 Subway Item for New York Approved

Mayor Walker of New York has signed the Municipal Assembly bill to enable the Board of Estimate to dispense with the certificate of the comptroller in including an item for \$13,000,000 for the amortization of a proposed issue of \$52,000,000 of short-term subway construction bonds in the 1928 budget.

A decision on the Citizens Union action to compel the board to eliminate the item from the budget is expected soon from the Court of Appeals. Both Supreme Court Justic Wasservogel and the Appellate Division decided in favor of the Citizens Union and the item is now out of the budget, with the understanding that it may be restored if the Court of Appeals' decision is favorable to the city administration.

The Board of Estimate on Jan. 20 postponed for one week approval of the contracts for the construction of the Nassau Street subway recommended by the Board of Transportation to get the opinion of a disinterested engineer, yet to be selected, on the merits of the "cut and cover" and tunnel methods of construction.

Express Service in Detroit to Be Extended

Just as soon as equipment is available express service on the Grand River Line of the Detroit Municipal Railway, Detroit, Mich., will be started. Since the inception of the express service on Jefferson Avenue the revenues on that line have been increased materially despite the falling off in employment in this section. Ultimately the commission expects to extend the service to all of the major lines of the system.

As one editorial writer put it the experiment was a great boon to people living on the lower east side and represented the nearest thing to actual rapid transit Detroit ever had known.

Details of the express service on Jefferson Avenue were given in an article which was contributed to the ELECTRIC RAILWAY JOURNAL, issue of Jan. 7, page 4.

Present Eight-Cent Fare in St. Louis to Continue

The present fare on the lines of the St. Louis Public Service Company in St. Louis, Mo., of 8 cents or two tokens for 15 cents will continue for at least another six months from Jan. 5, when the original order expired, since the city is not ready to proceed with the hearing of the valuation upon which to establish a permanent fare.

Last July the city, through its counselor, asked that the hearing be postponed until it could check additions and betterments to the properties claimed to have been made during the receivership. This check has not been completed.

Joseph H. Grand, city attorney for University City, has asked the Missouri Public Service Commission to abolish the extra fare charged passengers who transfer from the Delmar-Olive to the Creve-Coeur Lake line for points in University City.

Chicago Parking Ban is Boon to Car-Riders and Pedestrians

Because of the new no-parking ordinance which became effective on Jan. 10, downtown Chicago has become not only a speedier place to ride in but a safer place to walk in, according to E. J. McIlraith, traffic engineer of the Chicago Surface Lines. On this matter he is reported to have said:

The rule has increased the safety of street car passengers and of pedestrians. For one thing, motorists in the "Loop" have more room for driving—they have more chance to maneuver on the downtown streets without endangering anyone. That factor has increased general safety. Furthermore, pedestrians who cross streets or prospective passengers about to board street cars now have better visibility and therefore greater safety than when long lines of automobiles parked at the curbs blocked their view.

As to the speed and regularity of surface lines transportation there is no doubt that the parking ban has helped. It has practically eliminated street car jams in the "Loop." And it must be remembered that eliminating jams in the "Loop" means increasing the regularity of service not only downtown but throughout the city.

The new regulation has not been in force long enough, Mr. McIlraith believes, to determine accurately its effect on the volume of railway riding.

A few downtown business houses have reported an increase in patronage and some a slight falling off in business since the Loop streets were cleared of parked cars, but the consensus so far is that the law should be given a fair trial before it is repealed or permanently adopted. Acting on protests which he had received, principally from small "Loop" stores, however, Alderman J. J. Coughlin introduced a resolution in the City Council on Jan. 16 asking that interests opposed to the enforcement of the ban be given an early hearing by that body. The resolution was referred to a sub-committee on traffic regulation.

New York's Comptroller Has Plan

Tentative draft prepared of proposal he feels would solve transit problem. Commission's counsel dissents

OMPTROLLER BERRY of New ✓ York and his advisory committee on transit have prepared a report favoring the maintenance of the 5-cent fare for a trial period of three years and the submission of the fare question to the people of the city in a referendum at the end of that period if found necessary. This is the position which has been taken by Mayor Walker. The report also recommends unification of the city's transit lines and the creation of a "Transit Authority," with powers similar to those of the Port of New York Authority, to take over the unified system and lease it to an operating companv.

The report also recommends limitation of the profit of the operating company and provides for ultimate ownership of the transit lines by the city when the securities issued in payment for the properties of the Brooklyn-Manhattan Transit Corporation and Interborough Rapid Transit Company, in case their purchase is consummated, shall have been retired.

Comptroller Berry's present position, as indicated by the tentative report of his advisory committee, is said to be in line with the views of Mayor Walker and Mr. Delaney with the possible exception that the Berry committee report seems to recommend the inclusion of the surface lines, to which the Mayor and his advisers are said to have been opposed. It was suggested, however, that this might be subject to adjustment either by the city buying the surface lines at a price low enough to make their operation no great burden on the city or by an agreement to exclude the surface lines. The pending negotiations with the B.-M. T. have been on the basis of purchase of the rapid transit lines only.

One of the phases of the question on which the committee and the comptroller have not reached a definite conclusion is the organization of the company to operate the proposed unified system. It is assumed that any plan proposed would call for some combination of the B.-M. T. and the Interborough, but it is possible that a new operator might be sought. Under the terms of the proposed bill this would be a matter for the decision of the Transit Authority, perhaps with the concurrence of the Board of Estimate. Section 2 in the tentative report, not yet been drafted, probably will refer to the operating company.

On the comptroller's advisory committee are Jesse I. Straus, head of R. H. Macy & Company; Gen. George A. Wingate, surrogate of Kings County, and Elisha Walker, head of Blair & Company, bankers.

Comptroller Berry's plan to include surface lines in any proposal put forward for the unification of transit facilities would kill the 5-cent fare or load the city budget with deficits, Samuel Untermyer said on Jan. 24. Among other things he said:

The Legislature has intrusted the preparation of the plan to the Transit Commission and not to the Comptroller. Why does he not leave us in peace to work out this plan? When it reaches the Board of Estimate he has three out of sixteen votes for the adoption or rejection of the plan.

If he has any suggestions that would aid the commission, why does he not submit them there instead to the newspapers? If, when the plan is formulated, he does not like it, perhaps he will try his hand at another, provided his colleagues in the Board of Estimate do not adopt the commission's plan.

Meantime we are kept working overtime explaining away his constant digs at everything that is being done or attempted to

One Cent an Hour and Insurance Granted in Chicago

The arbitration award which settled the wage question on both the Chicago Surface Lines and the Chicago Rapid Transit systems was announced on Jan. 21 by the two arbitrators, Guy A. Richardson, vice-president of the Surface Lines, and Alderman Oscar Nelson, representing the employees. While the award is made in the case of the Surface Lines, the Chicago Rapid Transit Company and employees abide by its

Under the terms of the award, the employees receive in addition to the \$1,000 life insurance and \$20 a week sick benefit indemnity, 1 cent an hour increase in wages beginning June 1 and another cent beginning June 1 next year. The insurance, which is to be considered wages, amounts to approximately $1\frac{1}{2}$ cents an hour. The agreement runs until May 31, 1930.

In lieu of insurance from June 1, last, to Feb. 1 this year, trainmen who were in service on June 1 receive \$35 in cash and those who entered the service between June 1 and Nov. 1 receive \$12 in cash. This is done because it is practically impossible to make insurance retroactive. The amount of cash given the trainmen is approximately the amount of money it would have cost the Chicago Surface Lines in case the insurance had been in effect since June 1. Working conditions were not involved in the arbitration and remain the same.

Lines trainmen is 75 cents an hour. Following the award granting to trainmen on the Chicago Surface Lines \$1,000 in life insurance and \$20 a week sick benefit, the management of the Surface Lines has announced that the insurance benefits will be extended to all of the 16,500 employees of the company. This insurance will cost the company about \$650,000 annually.

The Chicago Rapid Transit employees are not affected by the clauses relating to insurance as they were granted insurance the previous year hy the company.

Under the provisions of the agreement for arbitration signed by union and company officials, it was understood that Messrs. Richardson and Nelson should proceed with the arbitration and reach an agreement if they could. In case they were able to agree they were empowered to make the agreement run until May 31, 1930. If they could not agree they were to select a third man and in that case the agreement could extend only to the end of the current fiscal year, ending June 1, next.

The union men asked for an increase of 15 cents an hour and the insurance features.

Rapid Transit Line to Flushing Opened

Rapid transit was extended on Jan. 21 over the Queensboro lines to Main Street, Flushing. Steinway Tunnel trains from Times Square, and Brook-Tunnel lyn, Manhattan Transit trains from Queens Plaza operate through to Main Street, Flushing. Second Avenue elevated trains will turn at Willetts Point Boulevard until such time as additional equipment is installed at the Flushing Terminal to accommodate them. Steinway Tunnel trains and the B.-M. T. trains will give a $3\frac{1}{2}$ -minute interval out of the Flushing Terminal during rush hours.

The Flushing Extension is approximately nine-tenths of a mile in length. The Queensboro Subway is one of the original lines provided by the Dual Contract, executed in 1913, but as originally planned, the Corona hranch of the line ended at Alburtis Avenue, 1½ miles distant from Flushing. The Transit Commission in 1921 authorized the extension of the line from Alburtis Avenue to Main Street, Flushing.

awarded by the commission in 1922, but were not approved until 1923.

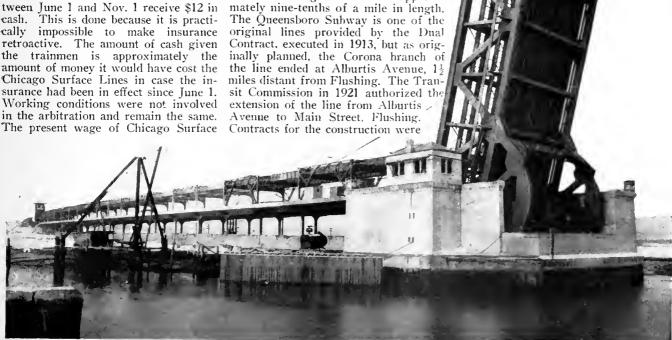
The extension is an elevated railroad running from the former terminus of the line at Alburtis Avenue, crossing Flushing Meadows and over Flushing Creek by bridge, and then by subway to Main Street, Flushing. Owing to the nature of the ground in Flushing Meadows, the completion of the line was delayed for almost a year. When the structure was first erected, it was found that the pillars supporting it, at a point near Flushing Creek, had settled perceptibly, and that it would have been dangerous to institute train operation over it. The structure, however, was found to be sound as far as Willetts Point Boulevard, and train operation to that point was started.

On the Flushing line, across Flushing River, is the Roosevelt Avenue Bridge, the largest trunnion bascule lift bridge east of Chicago and probably the largest of its exact type in the world.

An unusual feature of this bridge is that it is double-decked. The upper level will carry three rapid transit railroad tracks and the lower will provide a very much needed vehicular thoroughfare for this locality.

The clear height of the bridge is 25.6 ft., above mean high water, which is sufficient to permit the passage of ordinary tugboat traffic without opening the bridge. The Arthur McMullen Company was the general contractor and the McClintic-Marshall Company fabricated and erected the steel superstructure.

The bridge and approaches cost \$2,-700,000.



Roosevelt Avenue Bridge on Flushing Rapid Transit Line

Paving Schedule in Detroit Amounts to \$4,000,000

A schedule calling for the paving between tracks on approximately 50 miles of streets in Detroit, Mich., has been worked out by Del. A. Smith, general manager of the Detroit Department of Street Railways, according to an announcement by the department to the Detroit City Council. The estimated cost of the improvement is approximately \$4,000,000. Mr. Smith said that the lack of paving on the various streets scheduled to be paved is reducing the usefulness of the streets and impeding the progress of the railway system.

A reduction of \$2,500,000 in the department's gross earnings during the year 1926 hampered the expansion work. but it is anticipated that conditions will probably be such this year as to permit carrying on a large portion of the work. One of the larger projects scheduled for completion first is the section of Woodward Avenue between the Six Mile and

Eight Mile Roads.

The proposal voted upon by the Detroit electors, which would have relieved the Detroit Street Railway of the expense of paving between tracks, was defeated by a substantial majority, although it was pointed out by the sponsors of the proposition that electric railways in many of the larger cities had been relieved of the burden, which was a relic of the days when the street cars were drawn by horses.

Unified System for Oklahoma City Advocated

George A. Henshaw, a retiring receiver of the Oklahoma Railway, Oklahoma City, Okla., issued a formal statement to the press on Jan. 9, expressing his appreciation of the co-operation of city officials and the newspapers in connection with the affairs of the company under the receivership. Mr. Henshaw served jointly with the late John W. Shartel, and after Mr. Shartel's death with G. T. Lackey. When the company went into receivership three years ago it was rapidly losing money, but the receivers in that short period, by intelligent management and by cultivating the good will of the public, were able to place the system on a paying basis. Mr. Henshaw, in his statement, praises the present officials and employees of the company, declaring them to be highly efficient and urges the advisability of keeping the entire transportation system of Oklahoma City in the hands of one company.

New Franchise Urged for Grand Forks

The necessity for a new franchise if service to Grand Forks, N. D., is to continue was stressed recently by T. J. Smith, president, and M. M. Odegard, manager of the Grand Forks Street Railway. Urging the granting of the franchise sought, the president said the company could survive only if put on a business basis, which included a fair return to the stockholders. He said that the state charter, which expired this year, should be extended, and this required the two-thirds vote of the stockholders. A reasonable return could be assured the stockholders by relieving the company from the paving and repair charges which have been imposed during the past fourteen years.

Mr. Odegard said that \$50,000 to \$100,000 should be put into additiona! equipment within the next ten years.

Weekly Pass in Ohio for \$3.50

The Stark Electric Railroad since Jan. 23 has been offering a new weekly pass good between Alliance and Canton, Ohio, a distance of 18 miles, for \$3.50.

Regular fare for a ticket over this line is 50 cents one way, or a bargain

rate of 70 cents a round trip.

This ticket is of benefit to railroad and shop workers, who live in Alliance and work in Canton. It will also aid lawyers, court attendants and others since cars of the interurban stop in front of the County Court House.

\$7,000,000 for Transportation in New Jersey

Budgets for 1928 of the operating companies of Public Service Corporation of New Jersey representing a total of approximately \$37,000,000 have been approved. This expenditure is required for betterments in the transportation \$3,000,000 Spent by the Pacific and other service supplied in New Jersey. Approximately \$7,000,000 has been apportioned for transportation purposes for new equipment, replacements and general improvement of service.

Frank Hedley in Profile in the "New Yorker"

The soul of another millionaire straphanger has been laid bare—this time through the pages of the New Yorker. A personage no less imposing than Frank Hedley, president and general manager of the Interborough Rapid Transit Company, is made the subject of a sketch which condoles, condones, cavils, and caricatures the operating head of a great rapid transit system.

Like many others who inspire success stories this rapid transit genius comes from a family of workers. He himself left his home in England at the age of twenty and started at work in this country at \$2.40 a day in the Erie Railroad machine shops in Jersey City. And now at the age of 66 he goes down to 165 Broadway every day with the inclination and ability to scrutinize detailed reports of delays and minor accidents of the previous day which occurred on a system over which he has assumed control for the past 24 years.

If Frank Hedley's name is associated with present-day transit trials, nevertheless it will be something to conjure with in the future planning of transit

development.

Staggering To and From Work in New York

The stagger system was tested in New York on Jan. 23. Instead of reporting at 9 or 9:15 o'clock, as usual, the 10,000 employees of the Metropolitan Life Insurance Company arrived in four groups, the first at 8.30, the others at 8.45, 9 and 9.15. The first group went home at 4 o'clock in the afternoon and the rest followed at fifteen-minute intervals.

After watching in operation this plan he has sponsored for relieving subway congestion in rush hours, Dr. Louis I. Harris, Health Commissioner, said he would ask Mayor Walker to use his influence to obtain city-wide adoption of the stagger system. He expressed a special desire to see the Amalgamated Garment Workers, involving close to 100,000 persons, put it into effect. He said:

I am going to make a report to Mayor Walker and ask him to use his influence in bringing home the value of the plan to industrial groups and accelerating city-wide adoption. I will suggest it also on behalf of the city employees, a fair fraction of whom are concentrated during the day.

Previous to Jan. 23 7,000 of the Metropolitan employees reported at 9 o'clock and 3,000 at 9.15. The 9 o'clock group is now reduced to about 3,000 and the other 7,000 are divided into three groups approximately equal in number.

Electric Railway in 1927

More than \$3,000,000 was expended during 1927 in additions and improvements to various properties on the system of the Pacific Electric Railway, Los Angeles, Cal. As much or more will be necessary to provide for further planned improvements during 1928.

Outstanding in the improvements made in 1927 was the extremely large volume of trackage renewed with heavier rail. Throughout the system a total of 26,400 ft. was replaced.

The erection of two major grade separations, Pico Street and Hyperion Avenue, were the outstanding hazard removing additions during 1927. Four streets were separated by these two projects. Further safety measures were provided through the installation of 55 automatic wig-wag devices over the system, bringing the total of these devices to 555 now employed to warn of approaching trains.

New passenger station facilities were provided at the Hill Street subway station, at Santa Ana and at Pasadena, while at Long Beach a pretentious rebuilt station was completed. In addition numerous shelter stations were erected at various points over the system.

Other important improvements designated to improve the service were: new substations at San Gabriel, five de luxe motor coaches, overhead reconstruction and miscellaneous additions and improvements to bridges, buildings and other structures over the system.

Opposition Filed to Kansas City Short Line Project

Briefs urging the denial of a certificate of convenience and necessity to the St. Louis-Kansas City Short Line Railroad, which seeks permission to build an electric line between the two main cities of the state, have been filed by counsel for steam railroads operating between St. Louis and Kansas City with the Missouri Public Service Commission.

Six steam railroads would be affected adversely by the new line. The commission denied the application made in 1925 because the electric railway failed to make a proper showing of financial ability to carry through the project.

Lease for Suburban Service in Minneapolis Renewed

The Minneapolis, St. Paul & Suburban Railway, subsidiary of the Twin City Rapid Transit Company, Minneapolis, Minn., in suburban service, has renewed a lease made in March, 1906, with the Chicago, Milwaukee & St. Paul Railroad of the Minnetonka branch to Deephaven. It branches from the Excelsior line of the surburban company more than a mile west of Hopkins, and thence runs along the south shore of Lake Minnetonka. The lease has a 60-day written release clause by which either the railway or the railroad may cancel it. This formerly was a well-patronized steam line.

Interchange of Power Arranged at Providence

A frequency changer installed by the United Electric Railways, Providence, R. I., will permit an interchange of power between the company and the Narragansett Electric Company, both controlled by the Rhode Island Public Service Company. The interchange is planned only for emergency needs, with the railway intended as the principal beneficiary, since it puts at the railway's disposal all the available power of the electric company including that brought down from New Hampshire. The railway operates on 25 cycles, whereas the Narragansett power is of 60 cycles.

During rush hours the railway station is worked to capacity, while at off times during the day it is run light,

Eight Cents Sought in Ottawa

An 8-cent fare or seven tickets for 50 cents has been asked of the Dominion Board of Railway Commissioners by the Ottawa Electric Railway, Ottawa, Canada. The present fare is 5 cents.

Some time ago the company formally notified the city that it proposed to apply for an increase in fare for the five years beginning Aug. 14, 1928. It proposed a 7-cent fare or four tickets

for 25 cents for adults, from six in the morning until midnight. For children instead of a 3-cent fare the company suggested a 4-cent fare or seven tickets for a quarter. No change was considered in the after midnight fares, 10 cents cash.

That application has apparently been amended to request an increase greater than was originally intended.

Only One Amendment at a Time in St. Paul

The Charter Commission at St. Paul, Minn., has rejected the proposal by the City Council to have the voters act upon an amendment to the charter at the March 13 primary election, which would put the city in the position of being able to indulge in bus operation on its own account. The Charter Commission feared that such presentation would militate against passage by the voters of a proposed amendment to enable the Council to give the railway relief from some of the burdensome costs of operation, such as was suggested by the State Commission two years ago when it ordered the present rate of fare of 8 cents and six tokens for 40 cents. The amendment has been voted down twice at previous elections.

Intracity bus operation is now a monopoly of the Twin City Motor Bus Company, a subsidiary of the Twin City Rapid Transit Company, as part of the intercity system. The revenue is included in the railway returns and any move that would tend to reduce the revenue of the St. Paul City Railway would simply be an argument for increased fare before the State Commission.

Furthermore the Charter Commission wishes the question involved in the railway amendment to be determined on its merits unhampered by other issues. The work of completing paving on streets that carry street car lines now awaits a clear cut verdict by the voters on the amendment intended to grant relief to the company from this burden.

The special committee of the Charter Commission held to the opinion that to submit a companion amendment would be an invasion in spirit at least under which the city has agreed to co-operate in giving the railway amendment a fair and impartial test at the polls.

In commenting upon the theory of proponents of the bus amendment that it is merely an enabling act that does not commit the city to bus operation, the committee said:

The answer to both arguments is that as a weapon the amendment cannot be effective unless it carries the authority to issue bonds without further vote of the people. No less an economic problem than that of municipal ownership is involved in the present situation. We do not believe that a matter so serious and far-reaching should be submitted without the most careful thought and the widest possible public discussion. Linked with other questions it cannot have that attention.

Lucky Riders in Richmond

Richmond, Va., shoppers on Friday shopping tours will ride free on a street car under a new system just put in effect by the Virginia Electric & Power Company. Every Friday the company will designate one car on some one of its divisions "The Lucky Shopper," and anyone boarding that car between the hours of 10 a.m. and 4 p.m. will be treated to a free ride at the expense of the company. When the passengers board they will be greeted by the motorman: "You're a lucky shopper, the ride's on us."

The experiment was started on the Highland Park Forest Hill line on Jan. 20 when the 258 passengers who rode were given pamphlets entitled "You're a Lucky Rider."

There is no distinguishing mark on the free car. As indicated in the newspaper advertisement the feature is designed to speed up shopping between 10 a.m. and 4 p.m.

Whether to Smoke to Be Voted Upon in Maine Sections

The smoking problem is to be voted upon by patrons of the York Utilities Company, which operates between Sanford and Biddeford, Me. Snitable ballots are to be provided, which may be marked "yes" or "no," and deposited in boxes to be placed on all buses and trolleys.

William M. B. Lord, general manager, has declared he does not know whether the people who ride in buses and cars wish to smoke en route and is taking this means to find out.

New Plan to Save Hocker Line

Efforts looking toward the restoration of service on the Hocker line, officially known as the Kansas City, Lawrence & Topeka Electric Railroad, may yet be successful as a result of a conference between officials of the Sonken-Galamba Corporation, purchaser of the line, and officials of the Kansas City Public Service Company.

Under a plan for assisting in the financing of the line and putting it into operation offered the Sonken-Galamba officials by the railway, it was agreed to purchase \$15,000 in bonds providing the Sonken-Galamba Corporation took \$16,000 in bonds; to furnish power for the line at cost and to lease four street cars to the line. Engineers of the Kansas City Public Service Company estimate that rehabilitation would cost approximately \$16,000. The railway in Kansas City would receive a percentage of city fares on the line, which would run from the city market in Kansas City to Rose Hill, Kan.

Herman Sonken, president, said the Sonken-Galamba Corporation would accept the plan providing the communities along the line subscribed to \$10,000 in preferred stock of the new company. To this the towns have agreed. The Hocker Line is twenty years old.

Recent Bus Developments

Higher Fares in Westchester

The Westchester Street Transportation Company, Inc., controlled by the Third Avenue Railway System has been authorized by the Public Service Commission to increase its fares on five days' notice on its White Plains-Tarrytown line from 5 to 10 cents in the zone between the New York Central station in White Plains and the west line of Elmsford and between the east line of Elmsford and the end of the line in Tarrytown. This company succeeded the Westchester Street Railroad, the property of which went into the hands of a receiver and was sold at mortgage foreclosure.

Evidence before the commission showed that on the lowest valuation of the company's property used in providing transportation service claimed by Tarrytown and Greenburgh, the two objecting communities, the new rates proposed would not provide revenue sufficient to pay operating expenses and a reasonable return on such valuation. It was also shown in the evidence that for the three months ended Sept. 30, 1927, the operating expenses and tax a day amounted to \$334, while the operating receipts were \$251. The operating statistics of the company, as submitted. were not challenged by the communities after their accountant had examined the books of the company.

Bus Succeeds Batavia Traction

After nearly six months without transportation facilities, the city of Batavia, N. Y., is to have a bus line as a successor to the Batavia Traction Company, which was forced to give up last summer because of failing revenue.

Earl P. Churchill and Arthur H. Sands, Batavia residents, have received a permit to operate a bus line and have purchased two 34-passenger buses. Messrs. Churchill and Sands, the holders of the new permits, expect to start operation of the bus service on a Main Street route at once.

Bus Rights Incite Trouble in Toledo

A petition which sets up ten violations of various state laws, eity ordinances and regulations of the Ohio Public Utilities Commission has been filed by the Community Traction Company, against the Sylvania Buses, Inc., operator of a short interurban line from Sylvania into Toledo. Cancellation of the permit under which the bus line operates is asked.

The Sylvania Buses, Inc., has been competing with the railway on intracity business and was the chief offender against the ordinance passed by the city a year ago seeking to bar interurban

buses from handling city passengers. Its recent application for permission to put on four new coaches was denied by the Public Utilities Commission. It was brought out at the hearing that one of these buses had been operating for several months and in the petition just filed it is claimed that equipment has been operated though not certificated, not insured or bonded under the utilities Violations of schedules regulations. and routes, and of the prohibitory or-dinance of Toledo, are also cited as offenses which should be penalized by withdrawal of the company's certificate of convenience and necessity.

Buses on Alameda Line as an Experiment

Permission to discontinue operation over a portion of its San Jose Avenue line in the city of Alameda has been granted the Key System Transit Company, Oakland, Cal., by the California Railroad Commission. A trial is to be made of bus service for a period of 60 days.

Bus Service Extended in San Antonio

Regular bus service between Main Plaza and Kelly and Duncan Air Fields, San Antonio, Tex., is being supplied by the San Antonio Public Service Company. The fare is 25 cents cash or five tickets for a dollar.

Franchise Sought in Louisville

Grant would contain two general provisions: A city-wide operating right and regulation of that right administered by city.

Statement of company's position in matter

THE Louisville Railway, Louisville, Ky., is asking for the creation and sale of a bus franchise. It suggests a city-wide operating right of a nature that, if acquired by it, will enable it to "use the new type of gasoline street car" to supplement and extend the transportation system now conducted by it by means of electric street cars. It assigns four reasons why it should have a bus franchise and why that franchise should be city-wide in its scope. Those four reasons are:

1. An analogy to the city-wide operating rights of all other Louisville utilities.

2. That, by using the new vehicle, it may round out and extend its present street car service.

3. That the dominant characteristic of the new vehicle, its mobility, may be invoked to the maximum benefit of operating company and traveling public.

4. That it may be protected from purely destructive competition.

PROTECTION ASSURED TO CITY

The company suggests that the broad operating right may well be protected by city executive restrictions to be imposed in respect of:

1. Starting bus routes—agreement.

2. Modifying routes in operation—discretion of company subject to.

3. Stopping bus routes—option of either city or company. As a corollary and to protect capital to be invested, initial right to extend automatically on future grant of competitive right.

Lastly, the company wants to combine capital and operation of electric street car and bus lines to the end that it may operate one complete and combined transportation system and not two competitive enterprises.

In its request to the city the company says:

The situation is this. A new type of street ear has been developed. It is of advantage both to the transportation company and to the city that this new type

vehicle be utilized for the service of the traveling public.

In order to operate this new type vehicle a franchise is necessary. Any bus franchise that carries over the fixed route idea of the rail street car line will automatically rob both company and public of that one character that makes the bus worth while, its mobility. A flexible franchise is necessary then for the operation of a flexible transportation line.

What safeguard should be interposed for the protection of the city? This is suggested: No line can be started without city assent; any line can be stopped by city fiat. In this state of case the city has parted with nothing it cannot take back. As far as the company is concerned it must and it is willing to stand or fall on its future showing of useful service; its operation is legalized and its investment depends upon its own ability to perform. The city risks nothing and the company backs itself.

Assuming a franchise created and ac-

quired, how best to proceed?

The particular sections or routes where buses should be operated as well as the territory where parallel non-competitive service might be offered can be determined only after careful study and numerous experiments. For the good of both city and company the experiments should be as few and inexpensive as possible and advantage should be taken of all available studies of the city and its transportation system. It happens that within the past year a very careful and complete study has been made of these very things by at least three able and independent engineers.

The railway has retained John W. Burke, an engineer of wide experience, to revise its estimates of reproduction cost and sound value, while the city has engaged the Beeler Organization for the same purposes. These two, working independently, have made careful and complete studies of the city and the railway system. The company suggests their wide experience in matters of operation, car routing, etc., could be easily and promptly made available. It says:

There has also been completed a traffic survey covering the entire problem of surface traffic by Mr. Segoe, whose report to the Mayor's traffic committee is the basis of the traffic ordinance now pending.

Messrs. Burke, Beeler and Segoe have made independent studies of the cities' traffic problems from separate viewpoints and under separate engagements, and their data and studies, together with those of the railway, represent the expenditure of at least \$150,000 for collection of such data. With so large and comprehensive a mass of data available it would be most unwise and improvident to submit to the method of trial and error problems of service and routing which might be solved in conference.

Much time and expense might be saved were these gentlemen engaged to make a recommendation as to routes and operations not merely of buses but of electric cars as well. With the studies of the railway itself could be combined the ideas and suggestions from these independent sources to the end that a complete co-ordination of electric car and bus service be worked out in the most expeditious and most economical manner. The observation of like operation in other communities which Messrs. Burke, Beeler and Segoe have had opportunity for, could be constructively applied to the situation existing in Louisville with the result of saving both time and expense in arriving at that plan of operation for Louisville transportation which would be most useful to the public and most productive to the company.

CONCISE FORM OF FRANCHISE SUBMITTED

The company attached to its communication to the city a concise form of franchise under which the developments suggested in its appeal could be accomplished. The suggested period of duration of the franchise is twenty years. On the matter of fares the proposed grant read:

Section 4.—Rate of Fare.—The holder of this franchise may charge and collect toll during the first two years operation hereunder at a rate not exceeding 10 cents for each passenger carried within the city limits with free transfers between bus lines.

Provided: If this franchise be acquired by a person or corporation operating, in Louisville, a system of electrically propelled street cars running on rails, or by a subsidiary of such corporation, then,

(a) Such person or corporation shall give transfers from bus to electric car or vice versa and may charge not exceeding 10 cents for a single bus ride, which shall carry transfer privilege to electric cars and not more than the differential between the electric car fare actually paid and the bus fare for a transfer from the electric car to bus, and shall give transfers at no extra charge from bus line to bus line.

(b) The rate of fare to be charged for bus rides shall be controlled in the same manner and upon the same principles as may govern the fixing of electric car fare.

(c) In adjustment of either bus fare or electric car fare, or both, the fixing of the rate or rates of fare shall be based upon the combined properties in electric railway service and bus service and through consideration of the expense of both operations, and not either or both fares upon consideration only of one group of property or expense. Determination of the fair value of property used and useful in hus service rendered hereunder shall be made under the direction of city authorities and the reasonable expense of such determina-

tion shall be borne by the holder hereof. Such valuation shall be undertaken immediately upon the acquisition of this franchise, shall be completed within 90 days, and shall have the same force and effect as the similar valuation of the properties devoted to electrically propelled car service, and fare adjustments may be made at any time after the completion of said valuation without regard to the two-year provision above mentioned. Said valuation shall be made and applied without sacrifice or surrender of any rights of owner or city under the law of the land. In such adjustments of fare, or fares, the charge for transfer between like or unlike vehicles shall be subject to adjustment upon the same condition or conditions as the base fare or fares.

Mayor Favors a Monopoly 1N Transportation

If bus and railway lines are coordinated under a bus franchise to the Louisville Railway, the fare should not be more than 7 cents, the present car fare, Mayor Harrison said on Jan. 23 in discussing the bus situation. The Mayor also announced that the basic principle of any bus franchise that he approves and signs must be that the city shall have a "direct right and means to compel" the buyer of the franchise to operate buses over Louisville streets wherever they are needed. In the opinion of the Mayor, with the buses and street cars operating as one unit, there would be no occasion for a higher fare than is charged at present.

No date had been set for the next conference of city officials with representatives of the company. When the latter believe they have arrived at a proposition which might be acceptable to the city or when city officials have worked out details of a possible solution, there will be further meetings, the Mayor said.

The Mayor favors a thoroughly regulated monopoly in principle, but said that if a monopoly on transportation is granted in a franchise the public should be protected to a greater degree than would appear to be possible in the company's proposal.

Bus Connections at Champaign and Danville with Interurban

Additional bus line connections at Champaign and Danville are now offered by the Illinois Traction System, Springfield, Ill. At Champaign the Pierce Arrow Bus Line Company, Inc., is operating bus service between Urbana-Champaign and Chicago. The buses of this company have their terminal at the Illinois Traction System station in Champaign, and schedules are so arranged that direct connection is made with Illinois Traction trains.

At Danville, Ill., the Egyptian Transportation System has started bus service connecting Danville, Lawrenceville and Albion, making connection at the latter point with other bus service of that company to Eldorado, Hillsboro, Vienna, Metropolis and Paducah, Ky. Buses of this company leave the Illinois Traction System station at Danville at 7 a.m. and 3:30 p.m. No passengers are carried on these buses between Danville

and Ridgefarm. Tickets and baggage checking are handled at the Illinois Traction System station in Danville.

Buses for Marinette and Menominee

The Wisconsin Public Service Corporation, Green Bay, Wis., will spend \$95,000 for new buses to be operated in the cities of Marinette, Wis., and Menominee, Mich., according to the 1928 budget of the company. All electric railway property in these two cities will be abandoned and sold. The total value of the railroad property to be supplanted by the buses was carried on the books at \$435,000, divided as follows: tracks and roadway \$307,000, buildings and shops \$10,000, electric distribution equipment \$33,000, and operating equipment \$85,000.

New Bus Proposals Planned in Kansas City

Officials of the Kansas City Public Service Company, Kansas City, Mo., are working on the new bus plans to be presented to the City Council when the franchise expires.

These recommendations are said to have been decided upon, although it is probable that others will be added:

A new alignment of trunk lines, short enough to be profitable, and extending direct from the population centers to the downtown district.

Possibly purchase of new equipment. New feeder lines to unserved sections, calling for the purchase of at least a dozen light buses.

Suggestion of a new trunk line fare, probably 15 cents or two rides for 25 cents. Some substitution for present unprofitable Country Club Express service. Feeder line fare to remain unchanged at

Feeder line fare to remain unchanged at 10 cents, with transfer privilege.

According to President Powell C. Groner, it may be a matter of weeks before he and his associates will be ready to go before the City Council with the new bus plan. It is felt that the main trunk lines which compete with existing railway service should be self-supporting, that those who choose to ride on a pneumatic-tired bus with a seat guaranteed, should pay a fare sufficient to meet the operating cost.

As for the feeder lines which supplement the railway Mr. Groner desires an extension of feeder lines, with a retention of a 10-cent fare and transfer privileges. At least a dozen new light buses will be needed.

After the company has worked out a conception of an adequate co-ordinated transportation system, public meetings will be held by the Council to develop other ideas.

Would Operate Coach Service in Glendale

The Pacific Electric Railway has applied to the California Railroad Commission for a certificate of public convenience and necessity to operate motor coach service in the city of Glendale.

Financial and Corporate

Improvement in Toledo in December—Year's Figures

For the first time in two years the monthly report of the Community Traction Company, Toledo, Ohio, showed a surplus. For December the amount was \$2,807, due in part to the increased holiday business and to the readjustment of funds at the close of the year. There were carried on the system 4,167,159 passengers compared with 4,456,993 for a similar month the previous year.

Motor coach operation there accounted for 292,917 revenue passengers. They paid an average of 8.349 cents each, but operations resulted in a deficit of \$4,360.

The year showed a deficit to the stabilizing fund after taking care of all ordinance requirements. This amounted to \$361,825 compared with a deficit of \$253,952 for the previous year. Most of this difference was directly attributable to decrease in riding due to prevalence of more privately owned automobiles in the city, bus competition, and slump in industrial conditions over recent months. Total operating revenue for 1927 was \$3,408,386 compared with \$3,539,774 the previous year. Total expense of operations was \$2,615,184 for 1927 compared with \$2,659,982 for 1926. One cut of \$120,-000 in maintenance was made during the year.

Passengers carried in 1927 numbered 47,033,227 compared with 50,011,654 the previous year. The company operated 6,388,975 revenue car-miles and 1,031,-827 revenue coach-miles in 1927, and the previous year operated 6,667,419 revenue car-miles and 338,769 revenue

coach-miles.

The ratio of expense and taxes in Toledo to total operating revenue was 81.294 in 1927 as against 80.310 in 1926.

Youngstown Line Bought

Control of the Youngstown & Suburban Railway, running from Youngstown to Leetonia, has been purchased by Samuel Insull & Son of Chicago. The line was originally built to connect the local steel district with the Ohio River, but was later electrified and operated as a passenger line.

New Deal in San Antonio

The San Antonio Public Service Company, San Antonio, Tex., plans to take over the assets of the South Texas Public Service Company and the Comal Power Company, which will be dis-The former will be known as solved. the South Texas Department of the San Antonio Public Service Company, while the power station at New Braunfels will be known as the Comal Plant of the San

Antonio Public Service Company. There will be no change in management or operating force of the two companies, due to the consolidation.

Purpose of City Utilities Company Explained

St. Louis Public Service Official States Case for Company to Act for Large St. Louis and Kansas City Holders

HE relations between the St. Louis Public Service Company, which operates the railway lines in St. Louis and St. Louis County, Mo., and the City Utilities Company, which has asked the Missouri Public Service Commission for permission to hold 40 per cent of the common stock of the operating company, have been described by Stanley Clarke, executive vice-president of the St. Louis Public Service Company, in a statement issued to the press. He said in part:

City Utilities Company, a Delaware corporation, has asked permission to own approximately 40 per cent of our outstanding stock. From facts already stated in-

formally it appears:

1. That five or six large New York holders of our stock and 80 or 90 holders living in St. Louis wish to put their stock into a corporate unit. No one of them as an individual is able personally to look after his investment in our company or to afford alone the cost of employing competent employees to look after his investment in our operating company.

Therefore, these stockholders wish to form a pool to bear proportionately among themselves the expense of protecting their respective investments. Perhaps these stockholders should have unrestricted confidence in the operating managers of the railway to protect the investment of all stockholders; but their desire to have personal representatives keep track of their affairs is at no cost to anyone but themselves. Furthermore, any aid or assistance of a financial or other character which the corporate unit formed by these stockholders and its representatives is giving to our company is at the sole expense of these particular stockholders and no expense to

2. This City Utilities Company is not a holding company in the usual sense in which that term is used, because it does not seek to own a majority of the outstanding

capital stock of our company.

3. Not a cent of the expense of the City Utilities Company is paid by our company. There are, however, many benefits which will accrue to our company if permission will accrue to our company it permission is granted to these 80 or 90 of our stock-holders to put their stock into a unit, regardless of what name that unit is called.

To improve the service in St. Louis our

company needs large sums of money. As an executive, I know the difficulty of securing funds with which to make improve-ments in service. Until the average in-vestor believes what we now believe, namely, that when the public receives good service it will be willing to pay what it costs, our company must borrow from such people as are willing to invest more money to give better transportation, believing that

by doing so they will safeguard the investment they already have.

Our company was able to borrow \$1,000,-000 unsecured, from the City Utilities Com-

pany made up of our stockholders.

The Public Service Commission of the state of Missouri would have no control over the corporate unit owning shares of our outstanding stock, and this would be true, regardless of whether such corporate unit was a foreign corporation or a Missouri corporation. The reason is that the jurisdiction of the Public Service Commission of Missouri is confined to operating public utilities, and its duties are to protect the users of the service furnished by such utilities.

The City Utilities Company is seeking to hold 40 to 42 per cent of the stock of the St. Louis Public Service Company not for the purpose of controlling the St. Louis railway system, but for certain advantages to be derived by the group forming the company and by other stockholders of the operating organization and the public. Col. Albert T. Perkins, vice-president of the utilities company, so declared in a deposition given to City Counselor Muench of St. Louis on Jan. 18. Colonel Perkins' testimony will be sent to the Public Service Commission at Jefferson City.

Advantages to be gained by the utilities company holding from 40 to 42 per cent of the operating company stock are listed by Colonel Perkins as follows:

Its officers could watch over and safeguard interests of stockholders, thus re-lieving individuals of that responsibility.

The company could render financial aid to the operating company by obtaining credit with greater facility and at lower interest rate.

The company could advise and assist the operating company on transportation problems and other matters.

Colonel Perkins stated that already the City Utilities Company has loaned the Public Service Company \$1,000,000 to aid in the reorganization of the city lines. The holding company acquired no security and is charging only $5\frac{1}{2}$ per cent interest. He said the operating company would have been forced to pay a much higher rate of interest had it

secured the money elsewhere.

Colonel Perkins said that the \$1,000,-000 was obtained from the Central Union Trust Company, New York, after the utilities company put up sufficient securities as collateral. He said that no charge for services rendered the railway has been made to date and no charges for future services are under contemplation at the present time. He added, however, that if specific work is called for on a large scale outside of the general advisory functions a proper charge will undoubtedly be made.

Counselor Muench for the city endeavored to show that if the holding company could control the operating company it could also fix the value of the service rendered. He said:

If you control the election of directors and elect a friendly board, then, of course, you could rely on the board employing the holding company to render services rather than an outside company.

"Far-fetched, but possible," Colonel Perkins replied.

Extension Granted to West Chester Holders

An extension has been granted until Jan. 31 to security holders of the West Chester Street Railway, West Chester, Pa., in which to deposit their holdings under the terms worked out for the readjustment of the securities of the company. The time limit fixed originally for such deposit was Dec. 31, 1927. Announcement has been made that a large part of the securities have already been deposited. The appeal is addressed to the holders of the first mortgage 5 per cent gold bonds, due Aug. 1, 1932, first lien and collateral trust sinking fund gold bonds, Series A 6 per cent, due Oct. 1, 1939, 7 per cent participating cumulative preferred stock, common stock and secured promissory notes.

Spokane United Railways in Merger Deal

H. T. White, New York, chairman of the finance committee of the Washington Water Power Company, Spokane, Wash., and officers of the American Power & Light Company on Jan. 18 stated that subject to necessary corporate action and legal arrangements, it has been agreed that all holders of Washington Water Power common stock will be offered an opportunity for prompt exchange of their stock for American cumulative preferred stock no par value, paying \$6 a share annually, in the ratio of 2.2 shares of American stock for each share of Washington Water Power common stock. The offer is conditioned on acceptance by a sufficient percentage of the shares of water power common stock.

According to a statement to the New York Stock Exchange, the American Power Company's authorized \$6 no-par cumulative preferred stock would be increased from 500,000 shares to 2,000,000 shares and the authorized no-par common stock, from 2,300,000 shares to

4,000,000 shares.

While a merger of the Washington Water Power Company with American Power, now under way, would require the issue of a considerable amount of American Power preferred stock, it is not believed this would account for the proposed increases in American Power's capitalization. There are \$23,091,400 par value of Washington Water Power common shares outstanding. If all these are deposited under the merger offer, there would be 508,000 shares of American Power required for their exchange. The Washington Water Power Com-

The Washington Water Power Company owns a controlling interest in the Spokane United Railways.

Interest on Chicago Railways Bonds Ordered Paid

Payment of interest due on Feb. 1 on \$55,655,000 of first mortgage 5 per cent bonds of the Chicago Railways, Chicago, Ill., was ordered by Federal Judge Wilkerson in the United States

District Court. In the matter of interest on \$37,941,275 of junior mortgage bonds, also due at that time, the receivers were directed to hold sufficient funds for interest on those issues if the court should order payment, after deciding certain points in controversy.

Discontinuance of Non-Paying Line in California Refused

Reaffirming its stand against permitting a utility to abandon its non-paying properties, and to retain only paying properties, the California Railroad Commission denied the application of the Central California Traction Company to abandon service over its Sunnyside Line, partly within and partly outside the city of Stockton. The commission found that public convenience and necessity required the operation of the line in question, since patrons would be required to walk more than ½ mile if service were withdrawn.

In accepting the franchises, the commission ruled, a carrier obligated itself to furnish service to the community as a whole. Further it was almost universal that railways in furnishing such service expected and often operated non-paying ends of lines. In the present case the applicant leased to the Stockton Electric Railroad all of the existing local system covered by these franchises, with the exception of the line on which it now sought to discontinue passenger service. In the opinion of the commission it was pos-

sible that the Central California Trac-

tion Company was unfortunate in that

it had retained a decidedly unremunerative portion of that system; but the fact that it had chosen to divest itself of the better paying lines was no adequate reason why the public, who depended on the non-paying end for service, should suffer. The commission stated that its policy had never been to permit railways to select for operation only the income-producing portions of their lines and abandon those portions which, because of their distance from the center of population or because of other reasons, were not, in themselves, self-supporting.

New Interests in Groton & Stonington Road

F. E. Kingston & Company, New Haven, Conn., have acquired the majority of the first mortgage bonds and the shares of stock of the Groton & Stonington Traction Company, Norwich, Conn. Sale of the mortgage bonds and stock of the company was made on the advice of the stockholders' protective committee and represents the holdings of 75 per cent of the stockholders. The protective committee was named two years ago following default of interest by the Groton & Stonington Street Railway. The Kingston company paid \$425 for each \$500 first mortgage bond, with which was included ten shares of stock.

P. LeRoy Harwood has resigned as treasurer and director, and Lucius E. Whitton, New London, and Clarence Thompson, New Haven, have resigned

as directors.

Conspectus of Indexes for January, 1928

Compiled for Publication in This Paper by
ALBERT S, RICHEY
Electric Railway Engineer, Worcester, Mass.

		Month	Month Year	Since War	
	I atest	Ago	Ago	High	1 ow
Street Railway Fares* 1913 = 4.84	Jan.	Dec.	Jan.	Jan.	May
	1928	1927	1927	1928	1923
	7.59	7,57	7,42	7.59	6.88
Electric Raliway	Jan.	Dec.	Jan.	Sept.	Dec.
Materiala*	1928	1927	1927	1920	1927
1913 = 100	140.6	140.6	156.0	247.5	140.6
Electric Raliway	Jan.	Dec.	Jan.	Sept.	March
Wagea*	1928	1927	1927	1920	1923
1913 = 100	228.6	228.4	226.6	232	206.8
Am. Elec. Ry. Assn.	Jan.	Dec.	Jao.	July	May
Construction Coat	1928	1927	1927	1920	1922
(Elec. Ry.) 1913 = 100	200.9	200.7	203.5	256.4	167.4
Eng. News-Record	Jan.	Dec.	Jan.	June	March
Construction Cost	1928	1927	1927	1920	1922
(Geoeral) 1913 = 100	203.9	203,9	211.5	273.8	162.0
U. S. Bur. Lab Stat. Wholesale Commod- ities † 1926 = 100	Dec. 1927 96.8	Nov. 1927 96.7	Dec. 1926 97.9		
Wholesale Commod- ities 1913 = 9.21	Jan. 1 1928 13.57	Dec. 1 1927 13.53	Jan. 1 1927 12,82	Feb. 1 1920 20.87	June 1 1921 10.62
U. S. Bur. Lab. Stat.	Dec.	Nov.	1°ec.	July	March
Retail Food	1927	1927	1926	1920	1922
1913 = 100	155.9	156.5	161.8	219.2	138.7
Nat. Ind. Conf. Bd.	Dec.	Nov.	Dec.	July	Aug.
Cost of Living	1927	1927	1926	1920	1922
1914 = 100	163.6	164.2	168,4	204.5	154.5
Steel Untilled Orders	Dec. 31	Nov. 30	Dec. 31	July 31	May 3
(Million Tons)	1927	1927	1926	1920	1927
1913 = 5.91	3.973	3.454	3.961	11.118	3.051
Bank Clearings Outside N. Y. City (Billions)	Dec.	Nov.	Dec.	Oct.	Feb.
	1927	1927	1926	1925	1921
	19.89	19.50	19.76	20.47	10.43
Business Fallures Number Liabilities (Millions)	Dec. 1927 1818 52.21	Nov. 1927 1660 39.23	Dec. 1926 1979 91,88	Jan. 1924 2231 122.95	Aug. 1925 1353 27,22

*The three index numbers marked with an asterisk are computed by Mr. Richey, as foilows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

†This index is change to That

men employed on these roads.

†This index is changed to a base of "1926 = 100." That notation replaces the former basis of "1913 = 100." Inasmuch as the bureau has not calculated the index on this new base any further back than January, 1923, no figures are shown in this tabulation for the high and low points since the war. It is planned to compute the index on the new basis as far back as January, 1913. Until such time as the bureau makes public these figures for the earlier years this information will be lacking.

Default of Interest Looms on Puget Sound Electric Railway

Semi-annual interest due last Aug. 1 on the \$2,427,000 bonds of the Puget Sound Electric Railway has not been paid, and default looms again on Feb. 1, when next bond payments are due. It is problematical, executives admitted recently, whether the Tacoma Railway & Power Company will be able to pay interest due on April 1 on its \$1,200,000 bonds. Principal on this entire bond issue is due April 1, 1929.

The Tacoma Railway has operated for some years without a franchise under varying plans intended to put the property on a paying basis. Mayor M. G. Tennant expresses the conviction that eventually the city will operate its system of transportation. The city's position, he states, now is that before it can arrive at any satisfactory relations with the Tacoma Railway & Power Company the company will have to change its valuation at Olympia for rate-making purposes.

The circumstances surrounding the affairs of the Puget Sound Electric Railway were reviewed at length in ELECTRIC RAILWAY JOURNAL for July 30, 1927, page 209.

Another Merger Proposal in Washington

Merger discussions at Washington, D. C., were revived on Jan. 20 when Major Clayton E. Emig, former vicechairman of the public utilities committee of the Federation of Citizens' Associations, submitted to John W. Childress, chairman of the Public Utilities Commission, a brief outlining his own ideas for bringing about the long-

advocated consolation.

Major Emig referred to his plan as "suggestions on merger of Washington's transportation lines." It appears, however, to contain a combination of the cardinal features of the three different schemes for consolidation proposed by Harley P. Wilson, owner of the Washington Rapid Transit Company; B. BcK. Bachman, chief accountant of the Utilities Commission, Public Charles Hansel, specialist. The latter firm, it was recalled, prepared a merger plan at the instance of Major Emig for the utilities committee of the federation.

Major Emig borrowed from the Hansel plan the idea of extensive use of oneman street cars, which he said would save the consolidated company \$900,000 a year. From the Wilson plan he took the \$50,000,000 valuation for a merged company and a return of 7 per cent, which he said should be guaranteed for a period of 50 years. The Bachman plan was quoted for authority that under merged operations the companies could save \$1,500,000 a year.

Meanwhile representatives of the Washington Railway & Elcetric Company, the Capital Traction Company and the Washington Rapid Transit Company have been holding conferences on the merger subject and the merger

sub-committee has been functioning at the instances of the board of directors of the three systems affected.

Banker Takes Up Preferred Issue of Railway in Receivership

Several hundred Des Moines investors in 7 per cent preferred stock of the Des Moines City Railway, Des Moines, Ia., now in receivership, will receive the par value of their stock together with accrued dividends up to Jan. 1, 1928, through the almost unprecedented generosity of A. W. Harris, Chicago, chairman of the board of the Harris Trust & Savings Bank, trustee of both the bonds and the debentures of the railway. He has authorized the lowa National Bank, Des Moines, to take up the \$100,000 of outstanding stock in the hands of local purchasers at the original cost to them, and in addition to pay dividends up to the first of the year 1928.

Mr. Harris was, of course, under no legal or moral obligation to redeem the stock, as the receivership was unforeseen at the time the stock was sold and resulted from no action of his. However, those who know his feelings in the matter declared the banker was unwilling that Des Moines patrons of the company should lose through their purchase of stock, and that he was determined to keep their confidence.

Homer Miller, president of the Iowa National Bank, said that so far as he knew, the action of Mr. Harris was without precedent in American business, and that it proved beyond a doubt the integrity of the man who has backed

the Des Moines railway for years past. The stock was sold in 1922 and 1923 following the granting of the present service-at-cost franchise in the latter part of 1921. The sale resulted in a wide distribution of the stock locally, and did much to build up the strong public sentiment which now registers in Des Moines for the city railway company.

The stock would probably have been a complete loss to the buyers, with the exception of the dividends which have been paid regularly, except for the generosity of Mr. Harris. The railway will undoubtedly go to sale under the receivership, and few in touch with the situation believe that the amount realized will more than cover the first mortgage bonds and the debentures.

W. H. Sawyer Made Receiver of Ohio Road

Judge Frank M. Krapp of the Common Pleas Court of Springfield, Ohio, on Jan. 26 appointed W. H. Sawyer. Columbus, receiver for the Springfield Railway. The proceedings were brought by the Transit Improvement Company, to which the Springfield Railway owes \$680,000 and which has acquired and now owns the stock of the railway. A large part of the money owed to the Transit Improvement Company was ad-

vanced for bond interest and payment for franchise tax and paving assessments.

It is hoped by those interested in working out the difficulties of the Springfield property that the city and the receiver will join in a survey of the entire problem with a view to giving Springfield the best practicable service and putting the company in a financially healthy condition so that it may be able to finance new improvements and furnish service beneficial to the community.

Notes for Fort Worth Public

The Northern Texas Traction Company, Fort Worth, started the sale of 6½ per cent, 3-year notes to the public on Jan. 26. The total issue is \$1,500,000, of which \$1,000,000 is being taken by bankers and \$500,000 is to be placed locally with the public at a price of 98 per cent of par.

Removal Sought of a New York City Line

Purchase and removal by New York City of the Madison Avenue line of the New York & Harlem Railroad is asked in an application filed with the Board of Estimate, it was announced on Jan 20 by the Fifth Avenue Association.

\$1,250,000 Power Issue Offered

Whitaker & Company, St. Louis, Mo., and W. L. Ross & Company, Chicago,.. Ill., are offering at 100 and accrued interest, to yield 5.25 per cent, \$1,250,000 of Oklahoma Power Holding Company first (closed) mortgage 51 per cent sinking fund gold bonds dated Jan. 3, 1928, and due Jan. 1, 1943. The proceeds of the sale of the honds will be paid to the Oklahoma Railway as part of the purchase price of the property.

The Oklahoma Power Holding Com-

pany was organized under the laws of Delaware in December, 1927, to acquire the electric power plant heretofore owned and operated by the Oklahoma Railway, Oklahoma City. The property consists of a modern plant located at Oklahoma City with a present installed

capacity of 13,750 kw.

The property is leased under a contract to the Oklahoma Gas & Electric Company, for a period of 22 years, for a basic annual rental of \$225,000, plus taxes and full maintenance. The Oklahoma Gas & Electric Company also assumes the contract between this company and the Oklahoma Railway covering all the latter's power needs.

The bonds will constitute, in the opinion of counsel, a first mortgage on all the property of the company, subject to the contract to furnish the Oklahoma Railway its power requirements. A physical examination of the property by the engineering department of the Community Power & Light Company showed a present depreciated value of \$1,714,751. The entire issue of common stock of the Power Holding Company is controlled by the Oklahoma Railway.

Personal Items

Promotions and Appointments in Brooklyn

IN RECOGNITION of worthy records five employees of the Brooklyn City Railroad, Brooklyn, N. Y., were promoted Jan. 1. These men and their new positions are as follows:

on the "Big Four" division of the New York Central lines. He returned to the electric railway field in 1910 with the Union Traction Company at Indianapolis. Three years later he went tion of division superintendent at Maspeth. His assistant also has had varied experience in surface car operatino, but all in New York City. He began his railroad career in 1905 as a motorman at 58th Street depot. After a year he resigned but returned in 1907 as a motorman. In 1909 he was transferred to the Ninth Avenue depot, where he served as a stenographer and mileage computor. In 1911 he was appointed to the Public Service Commission staff as inspector of surface car operation, and was promoted finally to the post of supervisor of inspectors by the Transit Commission.



Leo E. Loomis
 L. H. Hoyer

R. A. Masters, superintendent of transportation.

F. J. Brennan, assistant superintendend of transportation.

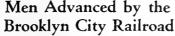
L. H. Hoyer, division superintendent at Fresh Pond.

E. M. Fletcher, depot master at Fresh Pond depot.

L. H. Hoyer and L. E. Loomis succeed Messrs. Masters and Brennan. E. M. Fletcher succeeds Mr. Hoyer as depot master at Fresh Pond depot.

James J. Duffy was appointed supervisor of employment and school for conductors and motormen.

R. A. Masters, the newly-appointed superintendent of transportation, has had nearly 25 years of experience in the railway industry. He started work as a conductor in 1904 with the Indianapolis Traction & Terminal Company, where he remained for three years. He then entered the interurban field as conductor on the Ben Hur Route between Indianapolis and Crawfordsville. At that time Clinton E. Morgan, vicepresident and general manager of the Brooklyn City Railroad, was general manager of this line. From 1909 to 1910 Mr. Masters worked as fireman







4. R. A. Masters6. E. M. Fletcher

to Jackson, Mich., to work for the Michigan United Traction Company and the Michigan Railroad, finally supervising operation of this company's line between Grand Rapids and Kalamazoo

Mr. Masters joined the organization of the Brooklyn City Railroad in January, 1920, and has been division superintendent in charge of the Halsey Street division and later the Fresh Pond division. His headquarters will be at 85 Clinton Street.

On Mr. Masters' staff will be F. J. Brennan, assistant superintendent of transportation, who will also have charge of the traffic bureau and the schedule department. Mr. Brennan was advanced to this rank from the posi-



F. J. Brennan
 J. J. Duffy

Mr. Brennan returned to the Brooklyn Company in 1921 as supervisor of headways, and later was in charge of operation for the Brooklyn Bus Corporation, a Brooklyn-Manhattan Transit subsidiary. From March, 1925, until January, 1927, he was superintendent of maintenance and operation of the Municipal Trolley Lines on Staten Island. A year ago he became division superintendent at Maspeth depot.

Mr. Brennan is a native of Brooklyn. He was graduated from Erasmus-Hall High School and also studied at Pratt Institute.

Mr. Hoyer, the new division superintendent at Fresh Pond, advances to his post as division superintendent from that of day depot master at Fresh Pond depot. His railway career also-dates from 1904, when he started as a conductor in Manhattan. He went to Brooklyn in 1905 and has served ther as motorman, instructor of motormen, inspector of instructors and depot master and has worked at the East New-York, 23rd Street, Ridgewood, Flatbush and Fresh Pond divisions.

Mr. Loomis, appointee to the Maspeth station, goes to the Brooklyn City-

organization from the West. For the past sixteen years he has been with the Michigan Electric Railway, Jackson, Mich. He first served the company as conductor and motorman in Battle Creek, beginning in March, 1911, and after two years was promoted to interurban motorman. During the year 1917 he was made train dispatcher and rapidly rose to be chief dispatcher. In 1923 he accepted the position of superintendent of the city car lines in Jackson, Mich. Just prior to going to Brooklyn, Mr. Loomis was superintendent of the bus line subsidiary of the Michigan Electric Railway, the Southern Michigan Transportation Company.

Edward M. Fletcher, now depot master at Fresh Pond, started in the railway industry in September, 1913, in the office of the general manager of the Virginia Railway & Power Company, at Richmond. In June, 1918, he began his apprenticeship in the operating field as a conductor, motorman and operator, and from January, 1922, until October, 1925, he served as a line inspector during morning and evening rush hours. He resigned his position with the Richmond property in November, 1925, to accept a position on the staff of the vice-president and general manager of the Brooklyn City Company.

Mr. Fletcher was born in Richmond, He attended public and private schools there.

James J. Duffy, now supervisor of employment and school for conductors and motormen, has spent his entire career as a railway operator on the Brooklyn surface lines. He was appointed motorman at Canarsie depot on Feb. 3, 1906. He advanced through the ranks of register taker, starter and register inspector at Canarsie depot in the next eight years and after a short period as a road inspector at Halsey Street depot, was made chief instructor at the 58th Street schoolroom on March 16, 1915. Mr. Duffy has spent the last thirteen years in the instruction branch of the service.

C. C. Slater President in Columbus

C. C. Slater, formerly vice-president and general manager of the Columbus Railway, Power & Light Company, Columbus, Ohio, was elected president at the annual meeting of stockholders and directors on Jan. 24. He succeeds Cyrus S. Eaton, of Cleveland.

Lyle Babbitt, secretary and auditor, will also serve as vice-president.

A. C. Beck, formerly assistant treasurer, is now treasurer.

Arthur dur Perron Succeeds Paul Seurot at Montreal

Paul Seurot, chief engineer of the Montreal Tramways Commission, has resigned in order to accept the position of rapid transit engineer for the Montreal Tramways, Montreal, Que.

Arthur dur Perron, civil engineer. Montreal, and professor of engineering at the Montreal Technical School, has been appointed chief engineer to succeed Mr. Seurot.

C. D. Porter Goes to Omaha

Made vice-president and general manager of property under the presidency of J. N. Shannahan

C. D. Porter, vice-president and general manager of the Virginia Public Service Company, successor to the Newport News & Hampton Railway, Gas & Electric Company, will resign on Feb. 1 to accept an appointment as vice-president and general manager of the Omaha & Council Bluffs Railway, Omaha, Neb., of which J. N. Shannahan was recently elected president. Mr. Porter became vice-president and general manager of the Newport News & Hampton Railway, Gas & Electric



C. D. Porter

Company in April, 1921, succeeding E. F. Peck, who was compelled to give up active work on account of ill health.

Mr. Porter was in charge of track construction in Washington, D. C., under Mr. Shannahan, after which he went to the New York Central as location engineer in charge of field work. Later he returned to be chief engineer of the Newport News & Hampton Railway, Gas & Electric Company, where he was in charge of all physical property and its upkeep. When Mr. Shannahan was elected president of the Maryland Electric Railway of Baltimore, Mr. Porter went with him as vice-president and general manager of its interurban line between Baltimore and Annapolis, remaining with that company until its absorption by the Washington, Baltimore & Annapolis Electric Railway. Upon completion of his work there Mr. Porter succeeded Mr. Peck on the Newport News & Hampton property and was with that company during the reconstruction period immediately succeeding the War.

In the recent utility mergers this property was absorbed by the National Public Service Company and Mr. Porter was retained as its vice-president and general manager, resigning to serve again with his former employer, J. N. Shannahan, in his work in Omaha.

The new assistant in Omaha is 44 years old. He is a graduate civil engineer of Renselaer Polytechnic Institute.

G. C. Baggett Named Superintendent of Houston Interurban

Grover C. Baggett has been promoted to the superintendency of the Galveston-Houston Electric Railway, Houston, Tex. In this capacity he succeeds Superintendent Howard, who left the services of the company some time ago.

Mr. Baggett went to Houston from Alabama in 1909 and became a conductor on the local railway lines. Two years later he was made a conductor on the interurban lines. In 1915 he was promoted to the position of dispatcher for the interurban and remained in that capacity until 1925 when he was made chief dispatcher.

Nomination of C. R. Porter to I. C. C. Approved

Approval was given Jan. 20 by the Senate Interstate Commerce Committee to the nomination of Claude R. Porter of Iowa to succeed Henry Hall of Colorado as a member of the Interstate Commerce Commission.

W. V. Drake in New Post With Monongahela Power System

W. V. Drake has been selected to fill the newly created position of superintendent of power plants of the Monongahela System according to a recent announcement at the office of Captain G. M. Alexander, president of the Monongahela West Penn Public Service Company. Mr. Drake, who will be located in Fairmont, already has assumed his new duties. For the past seven years he has been assistant to J. E. Thomas, superintendent of power plants for the West Penn Power Company, with main plants at Springdale and Connellsville, Pa.

Mr. Drake was named for the new position by H. A. Holmes, Fairmont, general superintendent of the power department. He stated that the new official would have general supervision of the operation and maintenance of all power plants of the company. These plants are located at Rivesville, Hundred, Parkersburg, Elizabeth, Grantsville and Sutton.

Maxwell Dabritz, former conductor on local lines of the International Railway, Buffalo, N. Y., has been appointed district manager in charge of the Seneca station. The new manager entered the employ of the International Railway in 1912. Two years later he was promoted to station clerk at the Hertel station and in 1927 was made master of the Hertel station. In his new capacity Mr. Dabritz succeeds District Manager Hooley of the Seneca station, who has been transferred to the Hertel station, succeeding John Reichel, who has been appointed special investigator.

Manufactures and the Markets

Details of \$1,170,669 Expenditure by Narrow-Gage Line

Data have been filed by the Boston, Revere Beach & Lynn Railroad with the Massachusetts Department of Public Utilities covering the estimate of the cost of electrifying the road. The total cost figure is placed at \$1,170,669, divided as follows:

\$597,564
215,769
124,850 58,961
177,500
18,700
22,325
15,000
\$1,230,669
60,000
\$1,170,669

The details of the car equipment expenditure of \$597,564 broken down into individual items follow:

CAR EQUIPMENT	
60 Passenger Motor Cars	
Electric equipment at \$3,975. Air brakes at \$925. Trucks at \$985. Heaters at \$275.	\$238,500 55,500 59,100 16,500
Labor at \$1,200 Painting at \$300 Installing leather seats twenty cars at \$624	72,000 18,000 12,480
Six Work Motor Cars Electric equipment at \$6,800. Air brakes at \$875. Trucks (two) at \$985. Labor at \$1,300.	\$40,800 5,250 5,910 7,800
Six Passenger Trailers Heaters at \$275. Equipment at \$250. Air brakes at \$925. Painting at \$300. Labor at \$150.	\$1,650 1,500 5,550 1,800 900
Total for all cars	\$543,240 \$54,324
Total	\$597,564
Buses and Truck Three coaches, 23-passenger, street car type, six cylinders at \$6,275 One 2-ton truck	\$18,825 3,500
Total	\$22,325

The so-called narrow-gage road passed recently to the control of Hemphill & Wells, New York, as told in detail in ELECTRIC RAILWAY JOURNAL for Dec. 10, page 1076.

Committee Approves Minneapolis Street Railway Budget

The street railway committee at Minneapolis, Minn., has approved a \$705,000 budget expenditure for 1928 by the Minneapolis Street Railway. Four extensions of existing lines include: Chicago Avenne, six blocks; Bloomington Avenne, four blocks, eliminating the present line on Cedar Avenne from 50th to 52nd and on 52nd to Bloomington; Nicollet Avenue line, four blocks into the newly acquired Richfield district;

Bryn Mawr, six blocks; doubling track five blocks on Washington Street NE.; doubling track West Broadway Penn Avenue to city limits. Other relaying of rails and special work will take the remainder of the budget.

Confer on Type of New Cars for Cincinnati Street Railway

Announcement was made on Jan. 18 at the offices of the Cincinnati Street Railway Co., that conferences are being held between officers of the company and various car builders concerning the purchase of new street cars for Cincinnati.

The matter has also been presented to Edgar Dow Gilman, director of public utilities, who will be called upon to approve both the type of cars and also the plan of financing their purchase.

Walter A. Draper, president of the railway, is reported to have said:

The policy of this company, when it took back the operation of its property a little more than two years ago, has been first to reconstruct a large portion of its track, and then to purchase new cars.

We have now proceeded so far with our track reconstruction program that I feel that the time has arrived for the purchase of new equipment to operate over the improved track.

While we have not decided on the exact type of car, we have been making a study of various types for several months, both here and elsewhere, and have been conferring with several car builders in order that our new cars may be the best and most efficient type obtainable.

Sales of Incandescent Lamps Increase in 1927

Sales of incandescent lamps in the United States during 1927 total approximately 320,000,000 large size and 218,000,000 small lamps, according to a review of the electrical industry for the year by John Liston of the General Electric Company. This is an increase of about 8,000,000, or 2½ per cent, in the large sizes over 1926 and 16,000,000, or 8 per cent, in the small sizes over the previous year.

Exhibitograph No. 2

HEARKEN

to the wee small voice that calls you to

Cleveland Sept. 22-28, inclusive

When it urges you to plan for a display at the 47th convention and exhibit of the A. E. R. A. Do it now!

Meeting of New Exhibit Committee Called

Col. J. H. Alexander, chairman of the exhibit committee of the American Electric Railway Association, has called a meeting for 10 a.m. Wednesday, Feb. 8, at his office with the Cleveland Railway in the Hanna Building, Cleveland. Ohio.

This is the first meeting of this committee and is called for organization purposes, to approve layout and floor plan showing detailed space arrangements with booth dimensions for the convention at Cleveland next Sept. 22-28 inclusive, and to consider such other matters as might properly come before the meeting at that time.

New Managing Director for Westinghouse of Japan

At a recent meeting of the board of directors of the Westinghouse Electric Company of Japan, J. W. White was elected a director and managing director of that company.

Mr. White has been respectively general manager of the Japan company, manager of the power section of the Detroit office, and manager of the Westinghouse International Company of Cuba

Сира.

New Cars for New Orleans Ready

Delivery is being made of the first of the twenty new street cars for the New Orleans Public Service, Inc.

Details of these cars, ordered in Aug., 1927, were carried in the issue of the Journal for Oct. 15, 1927. Ten of the cars were ordered from the St. Louis Car Company and ten from the Perley A. Thomas Car Company.

They are all-steel one-man two-man donble-truck double-end cars. Each has a seating capacity for 52 passengers and weighs 40,000 lb. The cars are equipped with four treadles per car, one in each corner because of operating conditions on Canal Street in New Orleans.

Slightly Higher Metal Prices

The prices of copper, lead, zinc, and tin were all slightly higher Jan. 25 than a week ago, though the market had not been active.

Excellent sales in the export market during the last two or three days have been a marked influence in removing the pressure to sell on the part of the custom smelters. The copper that was available from such sources until Jan. 23 at 14 cents for Eastern deliveries is no longer obtainable, and all sales Jan. 24 and 25 have been on the 14½-cent, Valley, basis. From Jan. 19 to 23, inclusive, the larger lots were sold at or near the 14-cent level in the East and 14.20-cent in the Middle West, with occasional sales up to the 14½-cent level, at which some special lots were purchased.

Foreign prices continue unchanged at

 $14\frac{1}{2}$ cents, c.i.f., and from 14.25@14.35 cents, f.a.s.

Prices for lead, not only in New York and St. Louis but in London, are virtually unchanged from a week ago. The American Smelting & Refining Company has maintained its contract price in New York at 6.50 cents.

Sales of zinc, like those of copper, have been well below normal, with about 2½ points difference between sellers' and buyers' ideas of the market. Judging by the gradual advance in the price, from 5.60 to 5.65 cents, sellers apparently have had more ground for their belief than buyers. Jan. 25 some quotations were made as high as 5.675 cents.

The tin market is dominated by buyers rather than sellers. Recent reports of exceptionally small shipments from the Straits, which a year ago would have caused a sharp advance in London, had only a slightly bullish effect on the other side, and in the domestic market almost no effect at all. In spite of the fact that the current prices are about 13 cents under those of January, 1927, and 10 cents under the average for the entire year, consumers are not satisfied to consider it "cheap. They may be wrong, but they feel they can afford to take the chance. Consumption in the automobile industry and by the tin-plate interests has picked up materially, but at the same time there is every evidence of a higher production rate in the Far East, so that the relative position is little changed. Tin of 99 per cent grade brings within 1 cent of Straits.

Rolling Stock Replacements Planned in Port Arthur

Eastern Texas Electric Company, which purchased the railway property of the Port Arthur Traction Company at public auction on Jan. 10, plans to rehabilitate that property and improve the service. Most of the rolling stock of the company will be replaced with more modern equipment, and the service previously operated by the company will be supplemented with buses, which will be operated in territory not previously served. The Eastern Texas Elec-

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

- 0 2 102 102 10	
Metals—New York Jan.	24, 1928
Copper, electrolytic, cents per lb	13.90 15.875
Lead, cents per lb. Ziuc, cents per lb. Tin, Straits, cents per lb.	6 50 6.00 55.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons. Somerset mine run, Boston, net tons. Pittsburgh mine run, Pittsburgh, net tons. Franklin, Ill., screenings, Chicago, net tons. Central, Ill., screenings, Chicago, net tons. Kansas screenings. Kansas Citv. net tons.	1.70 1.50 2.125
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft. Weatherproof wire base, N.Y., cents per lb. Cement, Chicago net prices, without bags Linseed oil (5-bbl.lots), N. Y., cents per lb. White lead in oil (100-lb. kcg), N. Y., cents per lb. Turpentine (bbl.lots), N. Y., per gal	5.30 16.75 2.05 10.4 13 25 \$0.645

tric Company operates the railway lines in Beaumont and an interurban line between Beaumont and Port Arthur.

ROLLING STOCK

Public Service Transportation Company, Newark, N. J., has just placed an order with the Yellow Coach & Truck Manufacturing Company, Chicago, Ill., for 331 Yellow Type Z gaselectric buses, for use on its lines in Newark and other cities.

DEPARTMENT OF STREET RAILWAYS of the city of Detroit, it is reported, will ask for bids on 25 to 100 new motor coaches.

TWIN CITY RAPID TRANSIT COMPANY, St. Paul, Minn., has accepted delivery on six Mack bus chassis, 230-in. wheelbase, four-cylinder motors, model AB.

Boston Elevated Railway, Boston, Mass., has accepted delivery of a White Model 50-B bus.

TRADE NOTES

RAILWAY TRACK WORK COMPANY, Philadelphia, Pa., has recently sold the Chicago Surface Lines a "Vulcan" rail joint grinder and three "Atlas" rail grinders.

NUGENT STEEL CASTINGS COMPANY, Chicago, Ill., has appointed Van Cortright Mekeel as special representative. Mr. Mekeel was formerly connected with the Taylor-Wharton Iron & Steel Company of High Bridge, N. J., as special research investigator, mechanical engineer and sales engineer.

Frank W. Gorman became associated on Jan. 1, 1928, with the Ohio Brass Company, Mansfield, Ohio, as district sales representative with headquarters in El Paso. Mr. Gorman, formerly with the Mine & Smelter Supply Company, El Paso, relieves L. M. Keating, who has moved to Mansfield, Ohio, to assume new duties in the general sales department of the Ohio Brass Company. The territory in which Mr. Gorman will operate includes Arizona, the Panhandle of Texas, New Mexico and Mexico.

Timken Roller Bearing Company, Canton, Ohio, announces it will occupy spaces Nos. 414-415 at the Mid-West Power Conference at Chicago, Feb. 14 to 18. Those representing the company at the exhibit will be L. M. Klinedinst, G. D. Thewlis. R. P. Proffitt, R. W. Ballentine, G. W. Curtis and R. P. Kellev.

COPPERWELD STEEL COMPANY, with the removal of its main office from Rankin to its new 20-acre mill at Glassport, Pa. announced that the headquarters of both the sales and engineering departments would be at Glassport. The personnel of these departments as now constituted, is as follows: Robert J. Frank, vice-president in charge of sales; Stanton Hertz, formerly electrical engineer, becomes sales manager; Rolf Selquist, formerly assistant electrical engineer, has

been appointed electrical engineer; William Jay McIlvane has been appointed district engineer, with head-quarters at New York, N. Y.; Erich G. Elg becomes district manager with head-quarters at Chicago, Ill. The company has also recently announced that S. H. Burr has joined the engineering department of the company, with head-quarters at New York. He was formerly inspector and line material specialist at both the Buffalo and New York offices of the Graybar Electric Company.

BRIDGEPORT BRASS COMPANY, Bridgeport, Conn., is opening a Boston office in its home territory. From the foundation of the company, in 1860, to the present time, New England industry has been serviced out of Bridgeport, and now the company, it is stated, finds it necessary to provide more and speedier service to its New England customers. In charge of the office will be William J. Hawkins, who has been associated with the company for more than twenty years. office is in the Park Square Building, No. 1060, in the Back Bay District, a short distance from both the Copley Plaza and the Back Bay Station.

ADVERTISING LITERATURE

AMERICAN ASPHALT PAINT Company, Chicago, has issued an artistic booklet entitled "In the Long Ago." The cover and text illustrations are the work of Lone Wolf, the Blackfeet Indian artist. A distinctive feature of the cover is an Indian teepee against a background of blue mountain ranges, that blend with other colors of green and black. The text deals with the discovery of "Gilsonite Asphalt" and with its history interwoven with the history and life of the West. Attention is directed in the booklet to the advantages of "Valdura Asphalt Paint."

DAYTON STEEL FOUNDRY COMPANY, Dayton, Ohio, has issued an illustrated folder devoted to a description of its improved Model 10 Dayton dual pneumatic steel wheel.

MURRAY CORPORATION OF AMERICA, Inc., Detroit, Mich., has issued an attractive illustrated booklet devoted to a description of its bus coach work.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y., has added to its looseleaf advertising folders the following sheets: "Constant-Speed Direct Current Motors, Type CD"; "Type GTE Motors for Gearless Traction Elevators"; "Low-Speed Synchronous Motors, Types TS and QS"; "Hand Starting Compensators, CR1034-K17-K21 and K22"; "Type WD-300A Arc Welder"; "Low-Speed Direct Current Generators"; "Atomic Hydrogen Arc Welding Equipment"; and to its loose-leaf advertising sheets "Automatic Supervisory Equipment Selector Type"; "CR4409 Protective Panels"; "CR7006-D26 Magnetic Switch," and "Improved Brush-Holders for GE-70 and GE-80 Railway Motors." It is also sending out loose-leaf pamphlet entitled D. & W. oit fuse cutouts type D.

There is nothing so useless as a hand brake that clogs and jams

PEACOCK Staffless Brakes are emergency brakes in the final sense of the word—they are built to serve when all other agencies have failed to bring a car under control. They have no margin of allowance for failure.

Even though the rigging may be loose and the brake shoes worn Peacock Staffless Brakes have ample chain winding capacity—144 inches to take in all the slack and set the brakes.

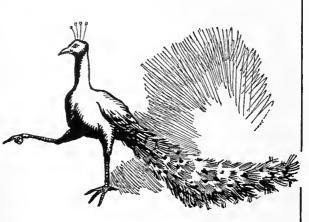
We are always glad to present installation and maintenance costs.

National Brake Company, Inc.

890 Ellicott Square

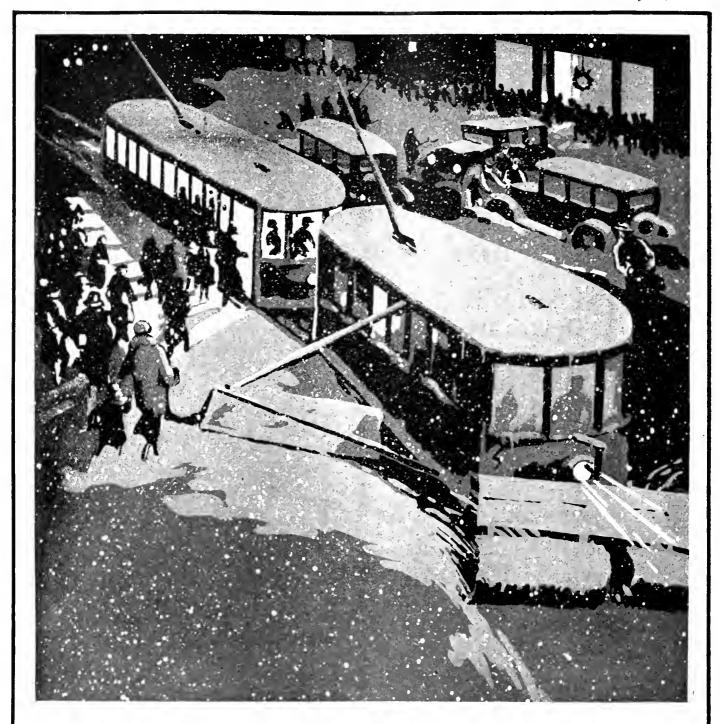
Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.





The Peacock Staffless



SERVICE yesterday - today - tomorrow Barron G. Collier Inc.

Candler Bldg. New York

FARE TOKENS



present risk. To cope successfully with this danger, use Scovill tokens. Their high quality of die work makes them difficult to reproduce. Starting with raw materials Scovill fabricates the brass and nickel silver, creates designs, and builds the tools, dies and special machinery. When you buy from Scovill, you not only get the highest grade tokens but the services of a modern organization with unequalled facilities.

Scovill means SERVICE to all who require parts or finished products of metal. Great factories equipped with the last word in laboratories, and modern machinery manned by skilled workmen, are at your disposal. 'Phone the nearest Scovill office.

SCOVILL

MANUFACTURING COMPANY

Waterbury

Connecticut

NEW YORK CHICAGO BOSTON SAN FRANCISCO DETROIT PHILADELPHIA LOS ANGELES ATLANTA PROVIDENCE CLEVELAND CINCINNATI

In Europe-THE HAGUE, HOLLAND

Member, Copper and Brass Research Association

ANNOUNCING THE FORMATION OF

UNITED ENGINEERS & CONSTRUCTORS INC.

DWIGHT P. ROBINSON, PRESIDENT

COMBINING

THE U. G. I. CONTRACTING COMPANY
OF PHILADELPHIA

PUBLIC SERVICE PRODUCTION COMPANY
OF NEWARK

DWIGHT P. ROBINSON & COMPANY, INC.
OF NEW YORK

DAY & ZIMMERMANN
ENGINEERING & CONSTRUCTION COMPANY
OF PHILADELPHIA

THE COMPANY THUS FORMED, WITH A BACKGROUND OF OYER FORTY-FIVE YEARS OF SUCCESSFUL WORK, WILL OPERATE IN ANY PART OF THE WORLD UNDER BROAD POWERS PERMITTING PARTICIPATION IN EVERY FORM OF ENGINEERING AND CONSTRUCTION ACTIVITY.

PRINCIPAL OFFICE-PHILADELPHIA
N. W. COR. BROAD AND ARCH STREETS

NEW YORK, NEWARK, CHICAGO, LOS ANGELES, ATLANTA, PITTSBURGH, HOUSTON, MONTREAL, RIO DE JANEIRO, BUENOS AIRES

CKED BY BLIN



urpasses every prediction

N interesting experiment has been in progress on our In the resting experiment had been selected as I lines for several weeks in which one of the new Twin Coach single deck street car type buses has been used.

This bus has a seating capacity of forty and we have carried as many as one hundred and twenty-one passengers at one time on this piece of equipment and each day it carries loads ranging from one hundred to one hundred and fifteen passengers without difficulty.

We are not in a position to say whether or not this bus is so constructed that it will stand up day after day under such strains as these loads impose, but if it is not built to meet the demands that are being put upon it, certainly the builders can without heavy expense add strength where required, so that such loads as I have mentioned can be handled without damage to the equipment.

It is our belief that this street car type bus is the most distinct advancement in bus construction that has so far been made and certainly overcomes the complaint in regard to the limited carrying capacity of buses for city service. Of course, it is clear to any one that an operating company having heavy peak loads to handle will effect a great saving in man hours, bus miles, in fact all operating costs if these large capacity buses can be used.

> De June Vice Pres. and Gen. Mgr.

"Excerpt from paper read at recent meeting of middle west railway executives.

NORTHERN OHIO POWER AND LIGHT COMPANY

Ind Sweeps the Industry

win oach Now Operating in: Pittsburgh, Penna. Akron, Ohio Washington, D. C. Cleveland, Ohio Chicago, Ill. Milwaukee, Wis. Minneapolis, Minn. Kansas City, Mo. Houston, Tex. San Diego, Calif. Oakland, Calif. Portland, Ore. Detroit, Mich. Los Angeles, Calif. Youngstown, Ohio Norfolk, Va. Wilkes-Barre, Pa.

The Most Significant Vehicle In All 1928 Transportation~



COLUMBIA

Railway Supplies and Equipment

Machine and Sheet Metal Work

Forgings
Special Machinery
and Patterns

Grey Iron and Brass Castings

Armature and Field Coils.

The Columbia Machine Works and M. I. Co.

265 Chestnut St., corner Atlantic Ave.,

Brooklyn, New York

Greater Service Per Dollar Invested



"Tiger" Bronze Axle and Armature Bearings

More-Jones "Tiger" Bronze castings for axle and armature bearing service was one of our early achievements. This is probably the most widely known bronze on the market. It has stood the test of time. There is nothing better for long, efficient and most economical results. Let us quote you.

National Bearing Metals

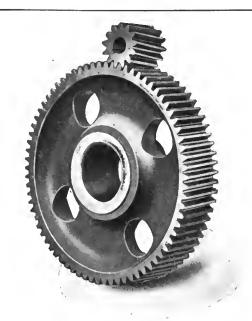
New York, N. Y. Jersey City, N. J.

Corporation Plttsburgh, Pa. Meadville, Pa.

St. Louis, Mo.

Postemouth Vo

"MORE-JONES QUALITY PRODUCTS"



And the Master Mechanic Laughed

A NUTTALL salesman walked into the office of the Master Mechanic of a large eastern railway. When the Master Mechanic saw the salesman he laughed.

"You can't sell me any gears," quoth the M. M.

"And, why not?" inquired the salesman.

Then the Master Mechanic took the salesman out into the shop and showed him some Nuttall BP gears that after ten years of service showed but .012 of an inch of wear.

"They'll outwear the car," said the Master Mechanic. "That's why you can't sell me any gears, we simply don't need 'em. But, believe me, Nuttall BP gears will go on all of our new equipment."

Send for our bulletin No. 52

R.D.NUTTALL COMPANY PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co.
District Offices are Sales Representatives
for Nuttall Electric Railway Products
Lyman Tube & Supply Co., Montreal, Toronto, Canada



ankers m Engineers

Ford, Bacon & Pavis

Engineers

115 Broadway, New York PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White **Engineering Corporation**

Engineers-Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

Design and Construction Examinations Reports Appraisals Industrial and Public Service Properties

ROSTON

CHICAGO

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys Better Service—Financial Reports Appraisals—Management

52 Vanderbilt Ave.

New York

SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Construction Examinations Reports

Management Valuations

CHICAGO

NEW YORK

SAN TRANCISCO

ENGELHARDT W. HOLST

Consulting Engineers

disals Reports Rates Service Investigation
Studies on Financial and Physical Rahabilitation
Reorganization Operation Management

683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAIGALS - RATES - OPERATION - SERVICE

J. ROWLAND BIBBINS

Engineer-2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development

Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies EXPERIENCE IN 20 CITIES

C. B. BUCHANAN President

W. H. PRICE, JR. Sec'y-Tress.

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction Financial Reports, Traffic Surveys and Equipment Maintenance

BALTIMORE 4 Citizens National Bank Bldg.

Phone: Hanover: 2142

NEW YORK 49 Wall Street

DAY & ZIMMERMANN, INC.

ENGINEERS

Design - Construction - Reports VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells Albert W. Hemphill APPRAISALS

INVESTIGATIONS COVERING ion Management Operation 43 Cedar Street, New York City Reorganization Construction

120 BROADWAY, NEW YORK

YOUNGSTOWN, O. CHICAGG, ILL.

TINANCING MANAGEMENT

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W. Washington Street, Chicago, Ill.

MCCLELLAN & JUNKERSFELD

Incorporated

ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations

Transportation Problems—Power Developments 68 Trinity Place, New York

Chicago

St. Louis

E. H. FAILE & CO.

Designers of

Garages- Service Buildings-Terminals

441 LEXINGTON AVE

NEW YORK

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass-Differential Fares-Ride Selling Holbrook Hall 5-W-3 160 Gramatan Ave., Mt. Vernon, N. Y.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES
ATLANTA, Candler Bullding
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CINCINNATI, Traction Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street

BB0FEF04EBB030B0FF0B1E0131BB3354331BB07EF333B325138[C0011F027FB33



WORKS Bayonne, N. J. Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate 1893 Stokers since

BRANCH OFFICES

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE., Failing Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Bullding
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

THE P. EDWARD WISH SERVICE

57 Church St. NEW YORK

Street Railway Inspection DETECTIVES

131 State St. BOSTON

TRAFFIC CONSULTANT

Freight Rate, Tariff and Traffic Analyses;
Advisory Freight Traffic Assistance
on Special or Monthly Basis;
Preparation of Cases before Interstate Commerce
Commission and State Commissions.

HALSEY McGOVERN

Mills Bldg., 17th and Pa. Ave., Washington, D. C.

When writing the advertiser for information or prices, a mention of the Electric Ratiway Journal would he appreciated.



CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

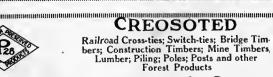
ELECTRIC HEATERS WITH OPEN COIL OR ENCLOSED ELEMENTS THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE



STUCKI SIDE BEARINGS

A. STUCKI CO. Oliver Bidg. Pittsburgh, Pa



F.Prettyman & Sons

B LIFE GUARDS

PROVIDENCE FENDERS

Manufactured by

CONSOLIDATED CAR FENDER CO., PROVIDENCE, R. I.

General Sales Agents
WENDELL & MacDUFF1E Co., 110 E. 42nd St., N. Y. C.

CHILLINGWORTH

One-Piece Gear Cases

eamless—Rivetiess—Light Weight est for Service — Durability and Economy. Write Us.

Chillingworth Mfg. Co. Jersey City, N. J.

CEDAR POLES

. Exementaministration (continuo taministration) (continuo taministration) (continuo taministration) (continuo t

BUTT TREATING ALL GRADES

TIES

WESTERN

BELL LUMBER CO., Minneapolis, Minn.

Efficient Bus Heating

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.

Cleveland, Ohio 7960 Lorain Ave.

Haskelite Manufacturing Corporation, 133 West Washington Street, Chicago



JOHNSON FARE COLLECTING SYSTEMS

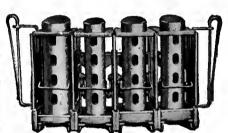


Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each harrel can be adjusted to eject from one to five coins or one to six tickets.





Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.

Kalamazoo Trollev Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.

500 million (1810) market million (1810) market million (1810) mil



THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

tlanta Chicago Cleveland Philedelphla Pittsburgh

New York

Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco

Seattle

Export Representative:
Uolted States Steel Products Company, New York, N. Y.

Bethlehem Products for Electric Railways

Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Frogs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Base Plates; Rolled Steel Wheels and Forged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

BETHLEHEM

TISCO MANGANESE STEEL SPECIAL TRACKWORK

Wharton Tisco Manganese Steel Trackwork will help you hold the up-keep down.

WM. WHARTON JR. & CO., INC. Easton, Penna.

B. A. HEGEMAN, Jr. President F. T. SARGENT, Secretary

J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co. Graybar Building, 420 Lexington Avo., New York

BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boyleton St., Boston, Mass.

Hegeman-Castle Corporation, Rallway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Anglo-American Varnish Co.,
Varnishee, Enamsis, etc.
National Hand Holds
Genesco Paint Oils
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Plowe
Feasible Drop Brake Staffs
Ft. Pitt Spring & Mfg. Co.,
Springs

Flaxlinum Insulation
Economy Electric Devices Co.
Power Saving and Inspection
Meters
National Safety Devices Company's Whistle Blowers,
Gong Ringers and Brake
Hangers
Godward Gas Generators
Cowdry Automotive Brake
Teeting Machine



FARE BOXES for BUSES

Let us tell you of this especially designed box for this class of service.

The Cleveland Fare Box Co.
4900 Lexington Ave., Cleveland, O.
Canadian Cleveland Fare Box Co., Ltd.

Canadian Cleveland Fare Box Co., Ltd. Preston, Ontario

.

COUNTING And Sorting Machines CHANGES Tokens



Buya STUDEBAKER 75 STREET CAR BUS



Heavy Duty Bus Chassis by STUDEBAKER



GREATER RIDER APPEAL

OWER

*first cost

*operating cost

*maintenance

*depreciation

ODAY'S bus riders are demanding more than mere transportation. Wide restful seats—full vision and adequate illumination—ample ventilation—sufficient warmth—convenient doors—wide aisles—proper head room and an inviting interior are almost as essential as a sturdily built chassis.

Studebaker now offers in its "75" Street Car Bus all of the elements that both operator and rider require. This bus body, which is mounted on the "75" heavy duty chassis of 184" wheelbase, is 208" long, 87" wide and has head room of 74".

Absolute comfort is afforded 21 passengers in the deep teather seats as the following dimensions prove. Located on each side of a 15½" aisle are the forward facing seats, spaced at 30½". Passengers sink back into the soft seats which provide about 2" additional knee room. The seats are 34" wide. Back of the wheel housing, side and rear seats accommodate 9 passengers. All seats are upholstered with genuine Spanish grain leather. The generous aisle and rear end space give plenty of room for 20 or more standees. A polished aluminum stanchion at the front and aluminum roof hand rods are provided.



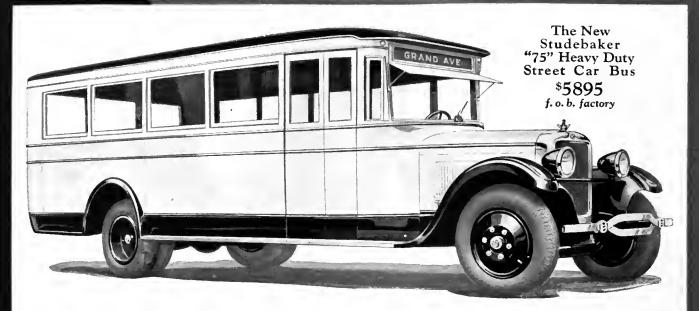
INSURES GREATER PROFITS

The wide windows raise easily to a 9" opening. Moving in a brass channel with rubber sections at top and bottom, these windows are air- and water-tight and will not rattle. Six dome lights against the white enamel ceiling give excellent illumination. Ventilation is maintained through the vents at each side of the windshield and through 3 roof ventilators. An exhaust-type heater forces a stream of hot air through a continuous 2" seamless steel tube. Exhaust odors cannot enter.

A most harmonious effect is obtained by the polished natural wood finish of the side walls, white enamel ceiling, and brown leather upholstery. Completely redesigned, this latest Studebaker offering is the type of bus that riders will wait for, because it provides a new conception of luxurious transportation. The first cost is lower than any other bus of comparable quality—the operating expense is low. The improved "75" Chassis offers longer life and lower depreciation—all combining to give the operator greater profits.

1	
- 1	Mail this coupon for further particulars THE STUDEBAKER CORPORATION
- 1	THE STUTE Coupon for f
- 1	Mail this coupon for further particulars THE STUDEBAKER CORPORATION OF AMERI Dept. B, South Bend, Ind. Car Bus, without
-1	D. CORPOD L. Particulars
-1	Please Dept. B. S. CAA FION OF
-2	Dept. B. South Bend, Ind. Car Bus, without
1	bus, without at plete specie
1	Car Bus, without obligation. We have:
1	Studebal "75" L
1	Dept. B. South Bend, Ind. Car Bus, without obligation. Studebaker Bus also believed.
ı	Charles about which present, Ch.
F.	chassis model you desire in the below
	We have Studebaker Bus about which you desire information. Chassis model. Type: Sedar.
	Street Commission Street Commission Street
	Chassis model Type: Sedan Parlor Car Capacity
	Car
	Name
	Patricine.
	some state
	Address
	Ca
	eny
	Star
	CityState
	B-2-29

HEAVY DUTY CHASSIS



Studebaker Bus Models and Prices

"75" Heavy Duty Model-184" wheelbase, dual rear wheels chassis only.....\$3275

chassis.....

chassis....

TUDEBAKER engineers designed this modern type street car bus to meet the presentday traffic conditions. The elements that determine the operator's profit are included in both chassis and body. No effort was spared to bring about this vital objective.

In building the body, infinite care was exercised to obtain exceptional ruggedness without exces-

sive weight. For this reason laminated wood construction is employed at all points where bends occur. 500 pounds excess weight is eliminated. By the use of cord welts and anti-squeak materials, and by giving necessary clearance between the ends of trim sticks, squeaks, rattles and rumbling are prevented.

chassis).....\$4520 All prices f.o.b. factory. Purchase can be arranged on Studeba-ker's liberal budget Passengers entering the wide folding doors are impressed with payment plan the attractiveness of the interior which reflects the same clean-cut appearance as the exterior. From the passenger's viewpoint this street car bus has no rival in comfort, luxury or convenience. It is precisely the type of street car bus that passengers will continue to patronize.

Equally important to the operator is the mechanical excellence of the chassis. During the past six months several refinements have been added to the already famous "75" heavy duty bus chassis which, according to the ratings of the Society of Automotive Engineers, is the most powerful bus chassis of its size and weight in the world. The power of the engine has been increased 30%. A fuel pump replaces the vacuum tank, its principal advantage being a full, positive flow of gasoline to the carburetor. On long, heavy pulls this feature is of great importance. The generator is cooled with a centrifugal blower type fan.

A newly designed double-face emergency brake, 14 inches in diameter, is mounted on the propeller shaft. A new type fan of greater capacity is driven

> by a four-ply cord belt. The mechanical fourwheel brakes have an improved hook-up giving life to the brakes. The 12-

members, including two large tubular units. The propeller shaft is made of 3-inch steel tubing. A four-speed forward transmission gives the operator the essential power for fast getaway in traffic and on steep hill climbs. A low center of gravity is obtained and the rear ramp eliminated by dropping the frame back of the wheel housing. Superlative riding comfort is insured by the extra heavy, six-ply, full balloon tires and improved springs. Wide spacing of the rear dual wheels allows chains to be applied quickly and easily.

Studebaker in offering this modern street car bus at the low price of \$5895 has established a new measure of value in the bus field.

21-Pass. Street Car Bus ("75" model chassis)... 5895 greater leverage and longer "76" Special-184" wheelbase dual or single rear wheels (chassis only)..... 19-Pass. Cross-Seat Sedan on "76" special chassis 5275 volt battery is easily ac-20-Pass. Parlor Car De Luxe on "76" special cessible through an open-22-Pass. Observation Parlor Car on "76" special ing in the side of the body. assis..... Junior Model—158" wheelbase (chassis The entire chassis of 184-....... 2410 Single or Dual Rear Wheels inch wheelbase is a master-15-Pass. Cross-Seat Sedan ("75" Jr. piece of rugged construction. The heavy pressed steel frame is securely held by nine stout cross-

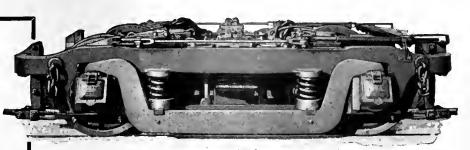
COMMONWEALTH Motor Truck

Designed for high speed interurban service.

Pedestals cast integral are machined and have renewable hardened steel liners applied.

Frame with cross and end transoms combined in one strong casting.

Commonwealth construction eliminates truck repairs and maintenance.



OMMONWEALTH Devices are standard on many Railroad Cars and Locomotives and have been in service for years as revenue producers in the reduction of maintenance and operation costs. Our engineering experience, designing skill, and large and modern facilities are the positive assurance of perfect products.

COMMONWEALTH STEEL COMPANY

GRANITE CITY, ILL.



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl Free-Winding Tension Spring Ratchet Wind Emergency Release Perfect Automatic Lubrication

Earll Catchers and Retrievers C. I. EARLL, York, Pa.

Conadion Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Opt.
In All Other Foreign Countries:
International General Electric Co., Schenectady, N. Y.

More cleaning power to you!

TIME savings on every cleaning job! Hand scraping and scrubbing reduced to a minimum! More cleaning from less cleaner!

All these are advantages that result from the greater cleaning power of Oakite materials—benefits you can realize on every cleaning job in your shops, whether removing muck from work on overhaul and repair jobs, washing the exteriors of cars or cleaning floors, windows, seats and interior woodwork.

A practical test conducted by our Service Man will prove the money-saving opportunities in store for you through Oakite cleaning. Write for details and booklet. No obligation.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U.S. and Canada

Oakite is manufactured only by OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

OAKITE

Industrial Cleaning Materials and Methods

"The Standard for Rubber Insulation"

INSULATED WIRES and CABLES

"Okonite," "Manson," and Dundee "A" "B" Tapes

Send for Handbook

The Okonite Company

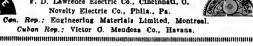
The Okonite-Callender Cable Company, Inc.

Factories, PASSAIC, N. J.

PATERSON, N. J.

Sales Offices: New York Chicago Pittsburgh St. Louis
Birmingham San Francisco Los Angeles Seattle
Pettingell-Andrews Co., Boston, Mass.

F. D. Lawrence Electric Co., Cincinnati, O.





Boyerized Parts:

Brake Pins
Brake Hangers
Brake Hangers
Brake Levers
Pedeatal Olbs
Brake Fulcrum
Turnbuckles
Center Bearings
McArthur

Spring Post Bushings
Spring Post Bushings
Bolter and Transom
Chafing Plates
Manganese Brake Heade
Manganese Truck Parts
Bushings
Bronze Bearings
McArthur
Turnbuckles

Can be purchased through the following representatives:

Economy Electric Devices Co. 72 W. Van Buren St., Chleago, Ill.

F. F. Rodler, 903 Monadnock Bldg., San Francisco, Cal. W. F. McKenney, 54 First Street, Portland, Oregon.

J. H. Denton, 1328 Broadway, New York City, N. Y. A. W. Arlin, 519 Delta Bldg., Los Angeles, Cal.

Bemis Car Truck Company Springfield, Mass.



EAST CHICAGO, INDIANA, U. S. A. ANT CONTRACTOR CONTRAC



Rod, Wire and Cable Products

NACONDA ANACONDA COPPER MINING COMPANY THE AMERICAN BRASS COMPANY General Offices . . 25 Broadway, New York

ANACONDA TROLLEY WIRE

NACHOD & UNITED STATES SIGNAL CO., INC. LOUIZVILLE,KY.



BLOCK SIGNALS FOR **ELECTRIC RAILWAYS** HIGHWAY CROSSING SIGNALS



Phono-Electric

Contact wire that gives three times the service of hard drawn copper. Hi-strength messenger and guy wires. Write for details.

Bridgeport Brass Co. Bridgeport, Conn

Arc Weld il Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

CHICAGO. NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADEL-PHIA, PITTSBUROH, BUFFALO, DETROIT, CINCINNATI, BALTIMORE, WILKES-BARRE, ST LOUIS, KANSAS CITY, ST. PAUL, OKLAHOMA CITY, BIRMINGHAM, MEMPHIS, DALLAS, ATLANTA, DENVER, BALT LAKE CITY EXPORT REPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK PACIFIC COAST REPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LOS ANGELES, PORTLAND, SEATTLE.



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 20-32 West Randelph Street. Cincinnati, Tractica Bldg.: New York, 100 E. 42ad St.





Trade Mark Reg. U. S. Pat. Off. de of extra quality stock firmly braided and smoothly finished Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

RAIL GRINDERS AND WELDERS

Railway Track-work Co., Philadelphia



EARCHLIGHT

USED EQUIPMENT @ NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED-RATE PER WORD:

Positions Wonted, 4 cents a word, minimum 7.5 cents an insertion, payable in advance. Positions Vacont and all other classifications, 8 cents a word, minimum charge \$2.00, Proposals, 40 cents a line an insertion.

INFORMATION:

Bex Numbers in care of any of our offices count 10 words additional in undisplayed ads. Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

POSITIONS VACANT

FOREMAN and assistant foreman wanted for car house located in New York City; state full particulars and salary expected. P-79, Electric Raliway Journal, Tenth Ave. at 36th St., New York.

POSITIONS WANTED

ARMATURE winder, wide experience, de-sires any kind electric rallway work, anywhere. Age 32. PW-78, Electric Rallway Journal, 7 So. Dearborn St., Chicago, Iii.

GENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MR. EXECUTIVE—Do you need a progressive equipment man? Assistant superintendent of rolling stock connected with large operating company wishes position carrying full responsibility for equipment; technically trained, age 35, with 10 years' practical experience. PW-80, Electric Railway Journai, Tenth Ave. at 36th St., New York.

MEN seeking positions in the electric rail-way field can reach over 6,000 executives by advertising in the Positions Wanted column. The cost is small.

When Writing Your Ad

Provide an indexing or subiect word.

Write it as the first word of your ad.

If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

This will assure proper classification in the column. The right is reserved to reject, re-vise or properly classify all Want Advertisements.

Proper Classification increases the possibility of Prompt Returns

EXCEPTIONAL BARGAINS in CARS!

Particularly LOW PRICED for Quick Disposal



LIGHT WEIGHT MODERN STEEL CARS, quadruple G. E. 264 motors, CP 27 air, weight 26,000 lbs. equipped. In excellent condition. This is a typical offer, representing our ability to save you money on your railway equipment needs. Send your inquiries for any kind of railway equipment. We buy, sell and recondition!

G. T. ABEL, Specializing in Used Railway Equipment 393-7th Ave., New York City Telephone: Longacre 7372-73

SNOW SWEEPERS

-Single Truck. Equipped for double end operation.

SNOW PLOW

-Double Truck. Air operated noses.

THE IRVING S. VAN LOAN CORP.,

1819 Broadway, New York City

Telephone: Columbus 4278

FOR SALE

Three Birney Safety One Man Cars, Cincinnati built, Agasote Ceiling, fine condition. Practically re-built each year.

Also one McGuire Cummings Soow Sweeper, long brush type, good as new.

SUSQUEHANNA TRACTION COMPANY Lock Haven. Pa

FOR SALE

13.000 kw. Used Rotary Converters

8—1500 kw.—25 cycles
2—500 kw.—25 cycles
with Transformers—Switch Boards, etc.
rice: \$5.00 per kw., in place, Cincinnati,

Ohio For further information address The Cineinnati Street Railway Company Cineinnati, Ohio

15 BIRNEY SAFETY CARS

Brill Built

West, 508 or G. E. 264 Motors Complete—Low Price—Fine Condition Cars Complete ELECTRIC EQUIPMENT CO. Commonwealth Bldg., Philadelphia, Pa.

WANTED TO BUY

300 Ton Wheel Press For Mounting Car Wheels

W-81, Electric Railway Journal Bell Telephone Bldg., St. Louis, Mo.

WANTED MOTOR CAR

for heavy switching service, cab type, body of steel construction not over 40 ft. in length.

W-76, Electric Railway Journal Guardian Building, Cleveland, O.

We buy entire Railways and Power Plants

We sell Street Railway and Power equipment

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but Electric Railway Journal assumes no responsibility for errors or omissions.

Advertising, Street Car Collier, Inc., Barron G. Alr Brakes
General Electric Co
Westinghouse Traction
Brake Co.

Air Springs
Cleveland Pneumatic Tool
Co., The

Anchors, Guy
Elec Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armacuce Shop Tools Columbia Machine Works Elec. Service Supplies Co.

Antomatic Return Switch Stands Ramapo Ajax Corp.

Automatle Safety Switch Stands Ramapo Ajax Corp.

Axles

Bemis Car Truck Co.

Bethlehem Steel Co.

Brill Co., The J. G.

Cincinnati Car Ca.

Standard Steel Works Westinghouse E. & M. Co

Babbitting Devices Columbia Machine Works

Babbit Metal National Bearing Metals Corp.

Badges and Bultons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry Nichols-Lintern Co.

Bearings and Bearing Melale Bemis Car Truck Co. Brill Co., The J. G. Cinctenati Car Co. Columbia Machine Works National Bearing Metal Corp. Westinghouse E. & M. Co.

Bearings, Center and Roller

Side Cincinnati Car Co. Columbia Machine Works Stucki Co., A.

Bearings, Roller Timken Roller Bearing Co.

Bells and Buzzers
Consolidated Car Heating
Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

itenders, Rail Railway Trackwork Co.

Body Material, Haskelite Plymeti Haskelite Mfg. Corp.

Bodies, Itus Brill Co., The J. G

Bollers Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus American Steel & Wire Co. Elec Service Supplies Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co

Bonds, Rall American Steel & Wire Co. American Steel & Wire Co. Elec. Service Supplies Co. General Electric Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E & M. Co.

Brackets and Cross Arms
(See slao Poles, Ties,
Posts, etc.)
Bates Expanded Steel
Truss Co
Columbia Machine Works

Elec. Ry. Equipment Co. Elec. Service Supplies Co.

General Electric Co. Hubbard & Co. Ohio Brass Co

Brake Adjusters
Brill Co., The J.
Cincinnati Car Co. National By. Appliance Co. Westinghouse Tr. Br. Co.

Brake Shoes American Brake Shoe & Foundry Co. Benns Car Truck Co Brill Co.. The J. G

Itrake Testers National Ry. Appliance Co.

Brakes. Rrake Systems and Brake Parts
Bemis Car Truck Co
Brill Co. The J G
Clincinnati Car Co.
Columbia Machine Works
General Electric Co
National Brake Co
Safety Car Devices Co.
Westinghouse Tr. Br Co.

Brakes, Magnetic Rail Cincinnati Car Co.

Brushes, Carhon General Electric Co Westinghouse E. & M. Co.

Rrushholders Columbia Machine Works General Electric Co.

Balkheads Haskelite Mfg. Corp.

Bunkers, Coal American Bridge Co.

Ruses
General Electric Co.
Studebaker Corp. of
America
Twin Coach Co., The
Yellow Truck & Coach Co.

Bos Lighting National Ry. Appliance Co

Bushings, Case Hardened and Manganese Benits Car Truck Co. Brill Co., The J. G Cincinnati Car Co., Columbia Machine Works

Cables (See Wires and Cables)

Cambrie Tapes, Yellow and Black Varnish General Electric Co. Irvington Varnish & Ins. Co.

Carbon Brnshes (See Brnshes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches Consolidated Car Heating Co. Westingbouse E. & M. Co.

Car Steps, Safety Cincinnati Car Co.

Car Wheels, Rolled Steel Bethlehem Steel Co.

Cars. Dump.
Brill Co., The J. G.
Differential Steel Car Co.

Cars. thas-Electric
Brill Co., The J G
General Electric Co.
Westinghouse E. & M. Co.

Care, Gas, Rall Brill Co., The J. G.

Cars. Passenger, Freight, Express, etc.
American Car Co.
Brill Co. The J. G.
Cincinnati Car Co., Kuhlman Car Co., G. C.
Wason Mig. Co.

Care, Second Hand Electric Equipment Co.

Cars, Self-Propelled Brill Co., The J. G.

Castings, Brass Composition or Copper or Copper Cincinnati Car Co. Columbia Machine Works National Bearing Metals Corp.

Castings, Gray Iron and

Castings, Gray Iron and
Steel
American Brake Shoe &
Foundry Co.
American Steel Foundries
American Bridge Co.
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works

Castings, Malleable & Brass American Brake Shoe & Foundry Co. Bemis Car Truck Co. Columbia Machine Works

Catchers and Retrievers, Eatchers and Retrievers,
Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas N.

Catenary Construction Archbold-Brady Co

Ceillag Car Haskelite Mfg. Corp.

Ceilings Plywood Panels Haskelite Mfg. Corp.

Change Carriers
Cleveland Fare Box Co
Electric Service Supplies Co

Change Trays Cincinnati Car Co.

Circuit-Breakere General Electric Co Westinghouse E. & M. Co.

Clampe and Connectors for Wires and Cables Columbia Machine Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. Hubbard & Co. Ohio Braes Co. Westinghouse E. & M. Co.

Cleaners Oakite Products, Inc.

Cleaners and Serapers Track
(See also Snew-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.
Long Mfg. Co.

Coll Banding and Winding Varhines Columbia Machine Works Elec. Service Supplies Co Westinghouse E. & M. Co

Coils. Armature and Field Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Colls. Choke and Kicking Elec. Service Supplies Co. General Electric Co. Westingbouse E & M. Co.

Coln Changers
Johnson Fare Box Co.

Coln Counting Machines Cleveland Fare Box Co. International Register Co. Johnson Fare Box Co.

Coin Sorting Marhines Cleveland Fare Box Co. Johnson Fare Box Co.

Colo Wrappers Cleveland Fare Box Co.

Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co
Westinghouse E. & M. Co.
Wood Co., Chas. N.

Commutators or Farta Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Compressors, Air General Electric Co. Westinghouse Tr. Br Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Condensor Papers Irvington Varnish & Ins. Co. Connectors, Solderless Westingbouse E. & M. Co. Connectors, Trailer Car Columbia Machine Works Consolidated Car Heating Co. Elec. Service Supplies Co. Ohio Brass Co.

Controllers or Parts Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Controller Regulators Elec. Service Supplies Co. Controlling Systems
General Electric Co
Westinghouse E. & M Co.

t'naverters, Rotary General Electric Co Westinghouse E. & M. Co.

Copper Wire
Apierican Brass Co
American Steel & Wire Co.
Amaconda Copper Mining

Copper Wire Instruments,
Measuring, Testing and
Recording
American Brass Co
Anaconda Copper Mining Co. Copper

Card. Bell. Trolley, Register American Steel & Wire Co. Brill Co. The J. G. Elec. Service Supplies Co. International Register Co. Roebling's Sons Co., John A. Samson Cordage Works

Cord Connectors and Couplers

Elec Service Supplies Co.
Samson Cordage Works
Wood Co., Chas N

Couplers. Car American Steel Foundries Brill Co., The J. G Cincinnati Car Co Ohio Brass Co. Westinghouse Traction Brake Co.

Cawl Ventilators Nichols-Lintern Co.

Cranes. Hoists & Lifts Electric Service Supplies Co.

Cross Arms (See Brackets) Crossing Foundations International Steel Tie Co.

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Frogs & Switches Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Crossings, Manganese Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtaine & Curtain Fixtures Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Ohlo Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghousa Electrical &
Mig. Co.

Dealer's Machinery & Second Hand Equipment G. T. Abel Cincinnati St. Ry. Co. Electric Equipment Co. Irving S. Van Loan Corp. Rennolds Enipment Co. Salzberg Co., Inc., H. E. Susquehanna Traction Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs Columbia Machine Works
Elec. Service Supplies Co. Detective Service Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.
Safety Car Devices Co.

Doors & Door Fixtures Brill Co., The J. G. Cincinnati Car Co. Hale-Kilhurn Co.

Doers. Folding Vestibule National Pneumatic Co. Safety Car Devices Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ohio Brass Co.

Dryers, Sand Electric Service Supplies Co. Westinghouse E. & M. Co.

Ears
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.

Ohio Braes Co Westinghouse E. & M. Co. Electric Grinders Railway Trackwork Co.

Electrical Wires and Cables Amer. Electrical Works. American Steel & Wire Co. John A. Roebling's Sons Co.

Electrodes, Carbon Railway Trackwork Co. Una Welding & Bonding Co

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Reeler, John A.

Bibbins, J. Rowland
Dav & Zimmermann, Inc.
Falle & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McCiellan & Junkersteld
McGovern, Halsey
Richey, Albert S
Sanderson & Porter
Stevens & Weod
Stone & Webster Co
United Engineers & Constructors, Inc.
White Eng. Corp., The J. &

Engines, Gas, Oll or Steem

Engines, Gas, Oll or Steam Westinghouse E. & M. Co.

Exterior Side Panels Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Perey Mfg. Co.

Ferr Registers
Electric Service Supplies Co
Johnson Fare Box Co. Fences, Weven Wire & Fence Posts

American Steel & Wire Co

Fenders and Wheel Guards
Brill Co.. The J. G.
Cincinnati Car Co
Consolidated Car Fender Co
Star Brass Works
Wood Co., Chas. N.

Fibre and Fibre Tubing Westinghouse E. & M. Co

Field Colle (See Colls) Floodlights
Electric Service Supplies Co
General Electric Co.

Floor, Sub Haskelite Mfg. Corp.

Floors Haskelite Mfg. Corp. Forgings

Brill Co., The J. G.

Cincinnati Car Co.

Standard Steel Works

Frogs & Crossings, Tee Rail Bethlehem Steel Co. Ramano Ajax Corp Wm. Wharton. Jr. & Co.

(Continued on page 46)



Are You Going To Throw That New Rolling Stock Away?

Not if you know it. But, if you run it over rough track, you might as well double your depreciation and repair estimates.

The Electric Railway Industry is enthusiastic over the new rolling stock now made available. These new cars hold possibilities for merchandising transportation that seems almost too good to be true.

But in our enthusiasm, let's remember that rolling stock has to be maintained, and the amount of maintenance is directly proportioned to the smoothness of track

Hence, whatever your plans for improvement, they should include track betterment.

And initial track cost demands that you obtain as near permanence as possible in your new track.

Dayton Tie Track has demonstrated in more than 150 properties throughout the United States that it is far more nearly permanent than any other.

Track maintenance is virtually nothing—rolling stock maintenance stays low.

Does Dayton Tie Track last?—we've been watching it 16 years, and serious trouble hasn't shown up yet.

Dayton Tie Track is always Smooth

THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO

The DIFFERENTIAL CAR



Standard on 60 Railways for

Track Maintenance
Track Construction
Ash Disposal
Coal Hauling
Concrete Materials
Waste Handling
Excavated Materials
Hauling Cross Tiee
Snow Disposal

Use These Labor Savers

Differentiai Crane Car Clark Concrete Breaker
Differential 3-way Auto Truck Body
Differential Car Wheel Truck and Tractor

THE DIFFERENTIAL STEEL CAR CO., Findlay, O. .

THE WORLD'S STANDARD

"IRVINGTON"

and Varnished Silk, Varnished Cambric,

Irv-O-Slot Insulation Flexible Varnished Tubing Insulating Varnishes and Compounds

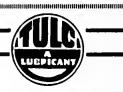
Irvington Varnish & Insulator Co. Irvington, N. J.

Sales Representatives:

Mitchell-Rand Mfg. Co., N. Y.
E. M. Wolcott, Rochester
I. W. Levine, Montreal
A. L. Gillies, Toronto
Consumers' Rubber Co., Cleveland \$ammammannasmesmenmammannammannammasmammasmassmassmasmannammannammannammannammannammannammannammannammannamman

Yellow

Varnished Paper



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment The Universal Lubricating Co. Cleveland, Ohio

Chicago Representatives: James Straus Bldg. ******************************



Double Register Type R-11

.

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

The International Register Co. 15 South Throop Street, Chicago, Illinois

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Least Maintenance

Lightest Weight Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO. CINCINNATI, OHIO

New York City, 30 Church Street

RAIL JOINTS

The Rail Joint Company

165 Broadway, New York City



Better Quality Seats For Cars and Buses

Hale-Kilburn Co. 1800 Lehigh Ave., Philadelphia, Pa



Car Heating and Ventilating

are to longer operating problems. We can show you how to take care of both with one equipment. The Peter Smith Forced Ventilation Hot Air Hester will save, in addition, 40% to 60% of the cost of any other ear heating and ventilating system. Write for details.

The Peter Smith Heater Company 6209 Hamilton Ave., Detroit, Mich.

តិសាធនាយកមានពេកនាយាយនៅក្នុងប្រជាពេលប្រធានាធនា នៅក្នុងប្រជាពេកនា នៅប្រជាពេកនា នេះបានការការការការការការការការការ



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc. 101 Park Avenue, New York City



VOMPANI

CAR COMFORT WITH

HEATERS REGULATORS **VENTILATORS**

2241-2247 Indiana St.

nicentronium proprieta i i controlla del controlla del controlla del controlla del controlla del controlla del

1328 Broadway New York, N. Y

.

Frogs, Tralley
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Fuses and Fuse Boxes Columbia Machine Works Consolidated Car Heating Co General Electric Co. Westinghouse E. & M. Co.

Gas Electric Drive for Buses General Electric Co.

Gaskets Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co

Gates, Car Brill Co., The J. G. Cincinnati Car Co.

Gear Blanks Brill Co., The J. G. Standard Steel Works

Gear Cases
Chillingworth Mig. Co.
Columbia Machine Works
Electric Service Supplies Co
Westinghouse E. & M. Co.

Gears and Pinions sears and Finions
Bemis Car Truck Co
Columbia Machine Works
Electric Service Supplies Co
General Electric Co.
Nat'l Ry. Appliance Co.
R. D. Nuttall Co.

Generators General Electric Co. Westinghouse E. & M. Co.

Girder Ralls

Bethlehem Steel Co.

Loram Steel Co.

Googs (See Bells and Googs) Grinders & Grinding Sapplies Metal & Thermit Corp.

Grinders, Portable Railway Trackwork Co.

Grinders, Portable Electric Railway Trackwork Co.

Grinding Bricks and Wheels Railway Trackwork Co.

Guard Ball Clampe Ramapo Ajax Corp.

Guard Ralls, Tee Rall & Manganese Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Guards, Trolley Elec. Service Supplies Co. Ohio Brass Co.

Barps, Trolley Columbia Machine Worka Elec. Service Supplies Co. National Bearing Metala Corp.
R. D. Nuttall Co.
Ghio Brass Co.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining Columbia Machine Works Haskelite Mig. Corp.

Heaters, Bus Nichols-Lintern Co.

Heaters, Car (Electric) Consolidated Car Heating Co. Gold Car Heat. & Ltg. Co. Railway Utility Co. Smith Heater Co., Peter

Heaters, Car, Hot Alr and Water Smith Heater Co., Peter

Henters, Car Stove Smith Heater Co., Peter

Helmets, Welding Railway Trackwork Co. Una Welding & Bonding Co.

Hoists & Lifts Columbia Machine Works

Hose, Bridges Ohio Brass Co.

Hose, Pneumatic Westinghouse Traction Brake Co.

Instruments, Measuring, Testing and Recording American Steel & Wire Co. General Electric Co. National Ry. Appliance Co. Westinghouse E. & M. Co.

Frogs, Track (See Track insulating Cloth, Paper and Wirrors, Inside & Outside Caper Tape General Electric Co. Irvington Varnish & Ins. Co. Okonite Co. Okonite-Callender Cable Co. Westinghouse E. & M. Co.

tnsulating Slik
Irvington Varnish & Ins.
Co.

Insulating Varnishes
Irvington Varnish & Ins.
Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Irvington Varnish & Ins.
Co. Co. Okonite Co. Okonite-Callender Cable Co. Westinghouse E. & M. Co.

tnsulation Slots
Irvington Varnish & Ins.

Co.

insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.
Ghio Brass Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins.

Co. Ohio Brasa Co. Westinghouse E. & M. Co. Interior Side Linings Haskelite Mfg. Corp.

Jacks (See also Cranes, Holsis and Lifts) Columbia Machine Works Elec. Service Supplies Co.

Joints, Rail (See Rall Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Lamp Guards and Fixtures Elec. Service Supplies Co. Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights) General Electric Co. Westinghouse E. & M. Co.

Lamps, Signal and Marker Elec. Service Supplies Co. Nichole-Lintern Co.

Lanterns, Classification Nichola-Lintern Co.

Letter Boards Cincinnati Car Co. Haskelite Mfg. Corp.

Lighting Fixtures, Interior Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.) Archbold-Brady Co. Electric Ry. Equipment Co. Elec. Service Supplies Co. General Electric Co. Hubbard & Co. National Bearing Metals Corp.
Chio Brasa Co.
Westinghouse E. & M. Co.

Locking Spring Boxes Wm. Wharton, Jr. & Co.

Locomotives, Electric Cincinnati Car Co. General Electric Co. St. Louis Car Co. Weatinghouse E. & M. Co.

Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oll and Grease Universal Lubricating Co.

Manganese Parts Bemis Car Truck Co.

Manganese Steel Guard Balls Ramapo Ajax Corp. Wm. Wharton Jr. & Co.

Manganese Steel, Special Track Work Bethlehem Steel Co. Wm. Wharion, Jr. & Co.

Manganese Steel Switches, Froga and Crossings Betblehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Motor Buses (See Buses)

Motors, Electric General Electric Co. Westinghouse E. & M. Co.

Motor, Generators & Controls for Electric Buses General Electric Co.

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Wood Co., Chas. N.

Nuts and Bolts

Bemis Car Truck Co.
Cincinnati Car Co.
Hubbard & Co.

Omnibuses (See Buses) Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Traction
Brake Co.
Vernishes

Paints and Varnishes (Insulating) Elec, Service Supplies Co. Irvington Varnish & Ins. Co.

Paints & Varaishes, Railway National Ry. Appliance Co. Panels, Outside, Inside Haskelite Mfg. Corp.

Paving Material
American Brake Shoe &
Foundry Co.

Pickup, Trolley Wire Elec. Service Supplies Co. Ghio Brass Co.

Pinion Pullers

Elec. Service Supplies Co.
Wood Co., Chas. N.

Pinions (See Gears)

Plns, Case Hardened, Wood and Iron Ohio Brass Co. Westinghouse Traction Brake Co.

Pipe Fittings Staudard Steel Worke Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches Ramapo Ajax Corp. Pllers, Rubber Insulated Elec. Service Supplies Co.

Plywood Roofs, Headlinlags, Floors, Interlor Panels, Bulkheads, Truss Planks Haskelite Mig. Corp.

Pole Line Hardware Bethlehem Steel Co. Elec. Service Supplies Co. General Electric Co. Ohio Brass Co.

Pole Reinforcing Hubbard & Co.

Pales, Metal Street
Bates Expanded Steel
Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.

Poles, Tles, Posts, Plling & Poles, Ties, Fosts, Fliing & Lumber Bell Lumber Co. International Crossoting Co. Naugle Pole & Tie Co. J. F. Prettyman & Son

Poles and Tles, Treated Bell Lumber Co. International Creosoting Co. J. F. Prettyman & Son

Poles, Trolley
Elec. Service Supplies Co.
R. D. Nuttall Co.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Portable Grinders Railway Trackwork Co.

Potheads Okonite Co. Okonite-Callender Cable Co., Inc.

Power Saving Devices
National Ry. Appliance Co. Pressings, Special Steel Cincinnati Car Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Punches, Ticket International Register Co. Wood Co., Chas. N.

Rail Braces and Fastenings Ramapo Ajax Corp. Rall Grinders (See Grinders)

Rall Joints Rail Joint Co.

Rail Joints, Welded Lorain Steel Co. Metal & Thermit Corp.

Rall Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Rallway Safety Switches
Consolidated Car Heating
Co.
Westinghouse E. & M. Co.

Raftan Brill Co., The J. G. Elec. Service Supplies Co. Hale-Kilburn Co.

Registers and Fittings legisiers and rathing Brill Co., The J. G. Cincinnati Car Co. Elec. Service Supplies Co. International Register Co. Ohmer Fare Register Co.

Reinforcement, Concrete American Steel & Wire Co. Bethlehem Steel Co. Carnegie Steel Co.

Repair Shop Appliances (See also Coll Banding and Winding Machines) Elec. Service Supplies Co.

Repair Work (See also Colls) Westinghouse E. & M. Co.

Replacers, Car Cincinnati Car Co. Elec. Service Supplies Co.

Resistances
Consolidated Car Heating
Co.
General Electric Co.

Resistance, Wire and Tube Westinghouse E. & M. Co.

Retrievers, Trolley (Sce Catchers and Retrievers Trolley)

Rheosiats
General Electric Co.
Weatinghouse E. & M. Co.

Roofing, Car Haskelite Mig, Corp.

Roofs, Car and Bus Haskelite Mfg. Corp. Safety Control Devices Safety Car Devices Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car Brill Co., The J. G. Cincinnati Car Co.

Sash, Metal Car Window Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated Elec. Service Supplies Co.

Seating Materials

Brill Co., The J. G.

Haskelits Mfg. Corp.

Seals, Bus Brill Co., The J. G. Hale-Kilburn Co.

Seats, Car (See also Rattan)
Brili Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Second Hand Equipment Cincinnati St. Ry. Co. Electric Equipment Co. Irving S. Van Loan Corp. Rennolda Equipment Co. Salzberg, Inc., H. E. Susquebanna Traction Co.

Shades, Vestibule
Brill Co.. The J. G.
Cincinnati Car Co.

Shock Absorbers
Cleveland Pneumatic Tool
Co., The

Shovels

Brill Co., The J. G.

Hubbard & Co. Shovels, Power Brill Co., The J. G.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting Consolidated Car Heating Co. Elec. Service Supplies Co. National Pneumatic Co.

Signale, Indicating Nichols-Lintern Co.

Signal Sysiems, Block Elec. Service Supplies Co. Nachod and United States Electric Signal Co. Wood Co., Chas. N.

Signal Systems, Highway Signal Systems, Live States.
Crossing
Nachod and United States.
Electric Signal Co.
Wood Co.. Chaa. N.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters Cincinnati Car Co. Columbia Machine Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. National Bearing Metals Corp.
R. D. Nuttall Co.

Smokestacks, Car Nichola-Lintern Co.

Snow Plows National Ry. Appliance Co.

Snow-Plows, Sweepers and Brooms

Brill Co., The J. G.
Columbia Machine Works
Consolidated Car Fender Co.

Snow Sweeper, Rattan J. G. Brill Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers Irvington Varnish & Ins. Co.

Special Trackwork
Bethiehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Spikes
American Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.
Splicing Sleeves (See Clamps
and Connectors)

Springe National Ry. Appliance Co.

Springs, Car and Truck
American Spiral Spring Co.
American Steel Foundries
American Steel & Wire Co.
Bemia Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works

Sprinklers, Track and Road Brill Co., The J G.

Steel and Steel Products
American Steel & Wire Co.

Steps, Car Brill Co., The J. G. Cincinnati Car Co. Stokers, Mechanical Babcock & Wilcox Co. Westinghouss E. & M. Co.

Stop Signals Nichols-Lintern Co.

Storage Batterles (See Batterles, Storage)

Strain Insulators
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand American Steel & Wire Co. Roebling's Sone Co.. J. A.

Street Cars (See Cars, Passenger, Freight, Express)

Saperheaters Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plaws, Sweepers and Braoms)

Switchee
General Electric Co.
Switch Stands and Fixtures
Ramapo-Ajax Corp. Switches, Selector Nichols-Lintern Co.

(Continued on page 47)

ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every cars is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Page	Page	Page	Page
Abel, G. L 41	Faile & Co., E. H32	Nachod and U. S. Signal Co 40	Standard Steel Works Co 6
American Brass Co., The 40	Ford, Bacon & Davis 32	National Bearing Metala Corp 31	Star Brasa Works 34
American Car Co.48 and Third Cover	"For Sale" Ads 41	National Brake Co., Inc 25	Stevens & Wood, Inc 32
American Electrical Works 40		National Pneumatic Co 13	Stone & Webster 32
American Steel Foundries 4	G 1 There's Gr 94 Peak Cover	National Ry. Appliance Co 34	Stucki Co., A 33
American Steel & Wire Co 40	General Electric Co 24, Back Cover	Naugle Pole & Tie Co 33	Studebaker Corp. of America,
Anaconda Copper Mining Co 40	Gold Car Heating & Lighting Co. 33	Nichols Lintern Co 33	Insert 35-36-37-38
Babcock & Wilcox Co 33	Goodyear Tire & Rubber Co 21	Nuttall Co., R. D 31	Susquehanna Traction Co 41
Bates Expanded Steel Truss Co. 40	•		
Beeler Organization 32	Hale-Kilburn Co 45		
Bell Lumber Co	Haskelite Mfg. Corp 33		Timken Roller Bearing Co.,
Bemis Car Truck Co 40	"Help Wanted" Ads 41	Oakite Products, Inc 39	Front Cover
Bethlehem Steel Co	Hemphill & Wells 32	Ohio Brass Co 5	Transit Equipment Co136
Bibbins, J. Rowland 32	Holst Englehardt W 32	Okonite-Callender Cable Com-	Twin Coach CoInsert 29-30
Bridgeport Brass Co 40	Hubbard & Co 40	pany, Inc., The 40	= min count committee no-ou
Brill Co., The J. G. 48, Third Cover		Okonite Co., The 40	
Buchanan & Layng Corp 32			77- 197 1 11 A TO 11 A
	Illinois Steel Co		Una Welding & Bonding Co 33
	International Creosoting & Con-	Perey Mfg. Co., Inc 45	Universal Lubricating Co 45
Chillingworth Mfg. Co 33	struction Co	Positions Wanted and Vacant 41	United Engineers & Constructors
Cincinnati Car Co	laternational Register Co 45	Prettyman & Sons, J. F 33	Inc 28
Cincinnati Steel Railway Co 41	International Steel Tie Co., The		
Cleveland Fare Box Co 34	Insert 11-I2		
Cleveland Pneumatic Tool Co 16	Irvington Varnish & Insulator		Van Loan Corp., Irving 41
Collier, Inc., Barron G 26	Co 45	Rail Joint Co 45	
Columbia Machine Works 31		Railway Track-Work Co 40	41777 414 4 7
Commonwealth Steel Co 39	Jackson, Walker 32	Railway Utility Co 45	"Want" Ada 41
Consolidated Car Fender Co 33	Johnson Fare Box Co 34	Ramapo Ajax Corp 45	Wason Mfg. Co., 48 and Third Cover
Consolidated Car Heating Co 14		Richey, Albert 32	Westinghouse Elec. & Mfg. Co.,
	Taller Datama & G. 00	Roebling's Sons Co., John A 40	Second Cover
Day & Zimmermann, Inc 32	Kelker, DeLeuw & Co 32		Westinghouse Traction Brake
Dayton Mechanical Tie Co.,	Kuhlman Car Co., 48 and Whird Cover		Co
Insert 43-44	48 and umrd Cover	Safety Car Devices Co 10	Wharton, Jr. & Co., Inc., Wm 34
Differential Steel Car Co., The 45		Salzberg Co., Inc., H. E 41	"What and Where to Buy" 42-46-47
	Lorain Steel Co 34	Samson Cordage Works 40	White Eng. Corp., The J. G 32
Earll, C. I		Sanderson & Porter 32	Wish Service, The P. Edw 33
Electric Equipment Co 41	McClellan & Junkersfeld 32	Scoville Mfg. Co	
Electric Ry. Equipment Co 45	McGovern, Halsey 33	Searchlight Section 41	Yellow Truck & Coach Co.,
Electric Service Supplies Co 7	Metal & Thermit Corp 8	Smith Heater Co., Peter 45	Insert 17-18-19-20
			2. 10-10-20

WHAT AND WHERE TO BUY-Continued from page 46

Switches and Switchboards Consolidated Car Heating Co. Elec. Service Supplies Co. Westinghouse E. & M. Co.

Switches, Tee Raii Ramapo-Ajax Corp. Switches, Track (See Track Speciai Work

Tampers, Tie Railway Trackwork Co.

Tapes and Clotha (See Insuiating Cloth, Paper and Tape)

Tee Rail Special Track Work Ramapo-Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Telephone & Telegraph Wire American Steel & Wire Co John A. Roeblinga Sone Co.

Testing fnatruments (See instruments, Measuring, Tasting, etc.)

Thermostats
Consolidated Car Heating
Co.
Gold Car Heating & Ligh

Co. Gold Car Heating & Lighting Co. Ratiway Utility Co. Smith Heater Co., Peter

Ticket Choppers and
Destroyers
Elec. Service Supplies Co

Ties and Tie Reds. Steel International Steel Tie Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties, Wood Cross (See Poles Ties, Posts, etc.)

Tires Goodyear Tire Co., The Tokens
Johnson Fare Box Co.
Scovilla Mfg. Co.

Tongue Switches Wm. Wharton, Jr. & Co.

Tools, Track & Miscellaneous
American Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Hubbard & Co.
Railway Trackwork Co.
Ramapo-Ajax Corp.

Towers and Transmission Structure American Bridge Co. Batee Expanded Steel Trues Co. Wastinghouse E. & M. Co.

Track Grinder Metal & Thermit Corp. Ratiway Trackwork Co. Ramapo-Ajax Corp.

Track, Special Work Columbia Machine Works Ramapo Ajax Corp.

Trackless Trolley Cars Brill Co., The J. G.

Transfer Issuing Machines Ohmer Fare Register Co.

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Treada, Safety Stair, Car Step Cincionati Car Co.

Tree Wire
Bridgeport Brass Co.
Okonite Co.
Okonite-Callender Cable Co

Troiley Bases
National Bearing Metala
Corp.
R. D. Nuttall Co.
Ohio Brasa Co.

Trolley Bases, Retrieving R. D. Nuttall Co. Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.

Trolley Material, Ovérhead Elec. Service Supplies Co. General Electric Co. National Bearing Metals Corp. Ohio Brase Co. Westinghouse E. & M. Co.

Frolley Wheel Bushings National Bearing Metals Corp. Star Brass Works

Frolicy Wheels (See Wheels Trolicy)

Trolley Wire
Amer. Electrical Works
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Bemts Car Truck Co.
Brill Co.. The J. G.
Cincinnati Car Co.
Commonwealth Steel Co.

Trncks, Motor White Company

Truss Piacks Haskelite Mfg. Corp.

Tubing, Yellow and Black Flexible Varnish Irvington Varnish & Inc.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co.
Turntables
Elec. Service Supplies Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Vaives Ohio Brass Co. Westinghouse Tr. Br. Co

Varnished Papers and Siiks Irvington Varnish & Ins. Co.

Ventilators, Car Brill Co., The J. G. Cincionati Car Co. Consolidated Car Heating

Co.
Nichols-Lintern Co.
Nichols-Lintern Co.
Nat'l. Ry. Appliance Co.
Railway Utility Co.
Vestibule Linings
Haskelita Mfg. Corp.

Welded Rail Joints
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric General Electric Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Welders, Raii John General Electric Co. Ohio Brass Co. Railway Trackwork Co.

Melding Processes and Apparatus Metal & Thermit Corp. Ohio Brasa Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Welding, Steel Railway Trackwork Co. Una Welding & Bonding Co.

Weiding Wire American Steel & Wire Co.

Railway Trackwork Co. Roebling's Sons Co., J. A.

Welding Wire and Rods Railway Trackwork Co. Wheel Guards (See Fenders and Wheel Guards)

Wheei Presses (See Machine Tools)

Wheels, Car, Steel & Steel Tire American Steel Foundries Bemis Car Truck Co. Standard Steel Works

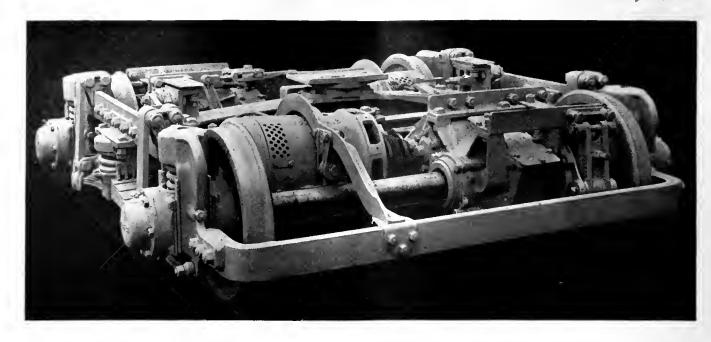
Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Bearing Metals
Corp.
R. D. Nuttall Co.
Ohio Brass Co.
Star Brasa Works

Whisties, Air Ohio Brass Co. Westinghouse E. & M. Co. Westinghouse Tractioo Brake Co.

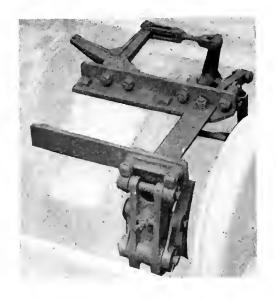
Window Gnarde & Fittings Cincinnati Car Co.

Wire Rope American Steel & Wire Co Roebling's Sons Co., J. A.

Wires and Chhies
American Brase Co.
American Electrical WorkAmerican Steel & Wire Co.
American Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Okonite Co.
Okonite Co.
Okonite Callender Cable Cn.
Inc.
Roehlins's Sons Co., J. A.
Westinghouse E. & M. Co.



Reducing Noise in Brake Operation



In keeping with the modern refinements of the Brill 1928 Model Car, and to reduce brake noises, external contracting shoe-type drum brakes were designed and installed.

A wide drum is pressed on each axle, diagonally opposite each other. An air cylinder is directly connected to the pressure applying levers and placed directly adjacent to each drum. This eliminates many rigging parts, reduces noise and increases the efficiency of the brake.

The brake drums and shoes are constructed of a special alloy which has long wearing and heat resisting qualities.

The brake parts are close fitted to further reduce noise and all parts subject to wear are bushed.

The shoe-type drum brake is one of the most important developments embodied in the Brill 1928 Model Car.





THE BRILL 1928 Model Electric Car, designed and built by Brill Engineers, is truly an outstanding example of present day electric car construction.

Performance tests prove conclusively

that this car can easily equal the speed of other forms of city transportation. In addition, "The Car for 1928" conforms to the latest ideas in appearance, riding qualities, noise reduction and low power consumption.

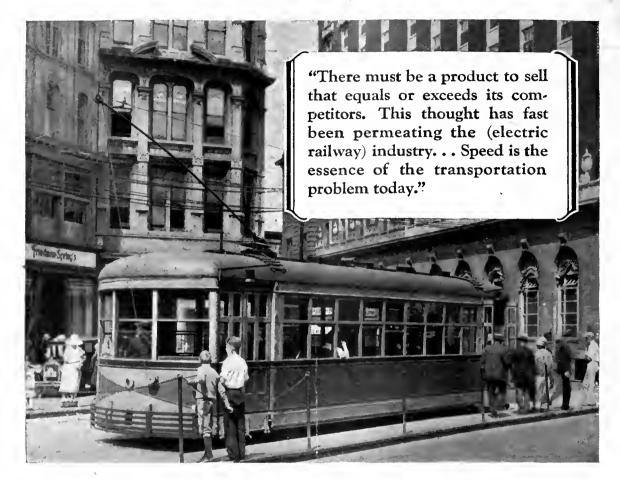
Write us for detailed specifications and performance facts.

The J. G. Brill Company
Philadelphia

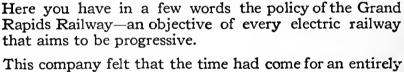
American Car Company St. Louis The G. C. Kuhlman Car Co. Cleveland

Wason Mfg. Company Springfield, Mass.





Step up the speedstep down the costs



This company felt that the time had come for an entirely new street car, designed to serve and satisfy the riding public, and to have a better net-earning power. It has put in operation 27 new light-weight cars which embody the latest results of practical experience in the equipment of electric rail coaches, and which have

- -developed schedule speeds of 9.5 miles per hr.
- —decreased energy consumption over 40% —increased passengers per car-mile over 60%
- This is one of many instances in which G-E Equipment

has had a part in demonstrating the earning possibilities Your G-E railway representative can of modern cars. give you maintenance figures for similar G-E Equipment covering a period of years.



The cooperation of General Electric is offered for the development of any improvement or the production of any electrical equipment necessary to a program of car modernization. Many instances can be cited in which modern G-E equipped cars have achieved notable savings or developed new sources of revenue.

PRINCIPAL SALES OFFICES COMPANY, SCHENECTADY, IN ELECTRIC

ELECTRIC RAILWAY JOURNAL

Graw-Hill Publishing Company, Inc.

FEBRUARY 4, 1928

Twenty Cents per Copy



1000

During 1927

Seventeen prominent public utilities invested over \$2,500,000 in O. C. C. motor coaches.

The largest coach-operating electric railway in the country invested nearly \$700,000 in Q. C. C. coach equipment.

Two companies backed their opinion of O. C. C. motor coaches with over \$200,000 in cash.

Two others invested over \$100,000.

Four more each invested over \$75,000 in Q.C. C. motor coaches.

Eight other companies spent at least \$50,000 each with Q. C. C.

HIS REMARKABLE CONCENTRATION on the products of a single motor-coach manufacturer indicates the high esteem of the foremost operators for Q, C, C coaches and for the Q, C, C institution.

AMERICAN CAR AND FOUNDRY MOTORS COMPANY 30 Church Street, New York City







that we will vote for an increase in fares"

WITH the new W-N drive car to offer, street railway companies can at last give the public benefits that will justify an increase in fares.

The public appreciates superior transportation and, what is more important, is willing to pay for it.

Patrons of the Brooklyn City R. R., when asked to write their opinions of the new W-N car, proved this beyond a doubt.

A few of the replies taken at random are an indication of what the W-N drive car will mean to many lines:

"Worthy of a ten-cent fare."

"I believe this car will attract many people who now use automobiles."

"Do we get all this for a five-cent fare?"

"Comfort of an auto-bus without its disadvantages."

Quiet operation Motors spring borne Gears run in oil Greater clearance

Faster acceleration

W-N Drive Installation

W-N Drive

advantages

Lowest steps

Lighter weight Lower maintenance

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse 1928

MORRIS BUCK Managing Editor JOHN A. MILLER, JR. Associata Editor CLARENCE W. SQUIER

EGIRG RATIONA

CHARLES GORDON, Editor

HENRY W. BLAKE Senior Editor GEORGE J. MAOMURRAY Naws Editor PAUL WOOTON Washington Correspondent

ALEX McCALLUM Editorial Representativa London, England

CONTENTS

FEBRUARY 4, 1928

Editorials185
Chicago Prohibits Parking in Its Central Area188 By E. J. McIllraith.
Before adoption of present ordinance a few individuals hampered free movement of many thousands. Under new law, vehicle speeds have gained from 15 to 30 per cent and usefulness of the streets has been greatly increased.
Index Numbers of Electric Railway Construction Costs
The relative costs of track construction by years is analyzed. Greater productivity per hour of track labor is found.
El Paso Wins Prize For Precaution Against Accidents. 193
The medium-sized electric railway has developed many excellent practices which brought for it the Brady award in its class.
Meeting Motor Truck Competition
Electrical Equipment of Railways in Switzerland Returns Large Profit
A "balance sheet" has been drafted to show the advantages secured by the electrical equipment of the Swiss trunk line railways. It indicates a cash saving during 1926 of nearly \$350,000 besides many indirect gains.
Association Activities
Modernization Programs Hold Delegates at C.E.R.A. Winter Meeting
both city and interurban railway facilities in territory. Executives impressed with favorable situation in Cincinnati.
Central Master Mechanics Discuss Modern Service Requirements
Papers dealing with recent developments in electric railway equipment occupy attention during Cincinnati meeting held on day before Central Electric Railway Association sessions.
Southern Equipment Men Discuss Progress Made in Service Improvements
New Yorkers Study Ways to Speed Up Service 205
Relief on traffic congestion and faster acceleration and retarda- tion were principal subjects of discussion at mid-winter meeting of New York Electric Railway Association.
American Association News
American Executive Committee Meets in Cincinnati 206
Engineering Executive Committee207
Maintenance Methods and Devices209
New Equipment Available210
News of the Industry
Recent Bus Developments
Financial and Corporate
Legal Notes220
Personal Mention
Manufactures and the Markets223

Topics That Are Timely

 ${f F}^{
m EW}$ if any better guides are to be found to the subjects that are uppermost in the minds of the men in the industry than the topics on the programs of the state, sectional and national bodies. It is true that the engineer is primarily interested in engineering, the accountant in things that have to do with audits, the claim agent in the reduction of accidents and in the prompt dispatch of the business of settlement after the claim arises, but to these men and the other specialists there is a fund of information common to all and a desire to know what the other fellow is thinking and doing.

Reports of these meetings have permanent value, but they have news value as well. It has always been the aim of the JOURNAL to cover these meetings as fully and as completely as was journalistically possible. It is justified as part of the paper's service to its industry. How well this paper has performed even in reporting meetings held almost simultaneously and in fact quite simultaneously is attested by the material which makes up a great part of this issue. The topics are timely and the JOURNAL means that they shall always be so treated.

McGRAW-HILL PUBLISHING COMPANY, INC.

Tenth Avenue at 36th Street, New York, N. Y. New York District Office, 285 Madison Ave.

JAMES H. MOGRAW, President
JAMES H. MCGRAW, President
JAMES H. MCGRAW, JR., V.-P. and Treas.
MALOCLM MEHR, Vice-President
EDWARD J. MEHREN, Vice-President
MASON BRITTON, Vice-President
EDGAR KORAR, Vice-President
C. H. THOMPSON, Secretary

Washington: National Press Building Chioago: 7 S. Dearborn Street PHILADELPHIA: 1600 Arch St. CLEVELAND: Guardian Building

ST. LOUIS: Bell Telephone Building SAN FRANCISCO: 883 Mission Street

Cable Address: "Machinist, N. Y." Publishers of

Engineering News-Record
American Mochiniat
Power
Chemical and Metallurgical Engineering
Oal Age
Engineering and Mining Journal
Ingenieria Interactional
Bus Transportation
Electrical Railway Journal
Electrical Metalling
Radio Retailing
Construction Methods

Electrical West (Published in San Francisco)

Agentical wat
London, E. C. 4
Member Associated Business Papers, Inc.
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations
The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska,
Hawaii, Philippines, Porto Rico, Cenal Zone, Honduras, Cuba, Nicaragua, Peru,
Colombia, Bolivia, Dominican Republic, Papanam, Ei Salvador, Argantina, Brasil
Spain, Urnguay, Costa Rica, Eenador, Gnatemala, Chile and Paraguay. Earta foreign
postage to other countries \$3 (total \$7 or 29 shillings). Subscriptions may be sent
to the New York office or to the London office. Single copies, postage prepaid to any
part of the world, 20 cents.
Change of Address. When change of address is ordered the new and the old address

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1928, by McGraw-Hill Publishing Company, Inc.

Published weekly. Entered as second-class matter, June 23, 1906, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

BETTER RAIL, BETTER TRANSPORTATION

Now for grinder maintenance

Are your track and rail grinders in good condition for the spring offensive against rough-riding track?

Look 'em over. Let us know if you think we can help. New parts are always ready for prompt shipment.

Be ready to send out your grinders in shape to do the whole job. They'll do it if you give them reasonable inspection and maintenance.

The same goes for your Ajax Arc Welders.

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

Chester F. Gailor, 30 Church St., New York Chas. N. Wood Co., Boston
Electrical Engineering & Míg. Co., Pittsburgh
H. F. McDermott, 208 S. LaSalle St., Chicago
P. W. Wood Railway Supply Co., New Orleans, La. Equipment & Engineering Co., London D 23 16 Frazar & Co., Japan



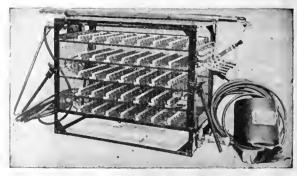
Vulcan Rail Grinder



Eureka Radial Rail Grinder



Reciprocating Track Grinder



"Ajax" Electric Arc Welder



O-B Copper Arc-Weld Bonds



Titon Bond-for rail-head application on standard joints. Note large steel terminals. Cat. No. 14841.

Hevi-bede Titon Bond-especially designed for heavily beaded and Weber type joints. Cat No. 15269.



tap of a hammer wedges the terminal firmly to rail before welding is started. Cat. No. 14776.

THE constantly improved service which car riders demand makes it essential that bonds deliver the full return expected. Only with such bonds is it possible to give faster service and at the same time reduce operating costs, thereby attracting both new investors and more riders. And this is just what O-B Rail Bonds help you do.

Providing a highly efficient track circuit, they insure higher, more uniform line voltage. This tends to keep cars on schedule, increases their speed, and reduces the number of cars required to maintain a given schedule—especially in the many less congested sections where considerable free running is possible. With the faster speeds and more uniform headway, riders are offered greater inducements to use the cars, and they ride more frequently. In addition to these advantages, direct savings also result from the use of O-B Bonds, for there is less maintenance of armatures, and power losses are practically eliminated.

The three widely used O-B Copper Arc-Weld Bonds shown here have proved popular on hundreds of properties with both welding crews and distribution men. Ask your O-B Salesman for a sample bond and complete details. Or address

Ohio Brass Company, Mansfield, Ohio Dominion Insulator & Mfg. Co. Limited Niagara Falls, Canada

LOS ANGELES SAN FRANCISCO

PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS CAR EQUIPMENT MINING MATERIALS VALVES



Modern Traffic Conditions Demand a New Margin of Safety— Wariable Load Bushes Browides It

The Variable Load Brake Provides It

When thoroughfares are crowded... when traffic is congested...when other vehicles are contending for the right of way...when rush hour periods demand quick mass transportation...then, above all times, should adequate operating safety be assured.

As a means of securing maximum safety for modern intensive city service, the Westinghouse Variable Load Brake stands pre-eminent. It provides a uniform degree of brake effectiveness throughout the entire range of car loading—by automatic adjustment of brake cylinder pressure—and assures consistently short stops for all conditions, inspiring the operator with confidence that he can make good time over the route in perfect safety.

Many traction companies are specifying this improved brake for their new light weight cars—it is needed for strictly modern equipment.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works, WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES

Introducing a Slogan



The Second Edition of the Paved Track Notebook which will be ready to mail about February 5th discusses the principles of Mass-Production Methods, shows the latest developments in track construction equipment and their application to paved work with steel ties.

Ask for your copy now!

1928 Track Construction will be on a Production Basis

In THE industry of mass transportation during the past decade all of us have observed the benefits of reducing to a phrase those proposals which all agreed were essential to its life and continued success — Modernize! — Sell Transportation! — Co-ordinate the busses and the cars!—Buy New Cars! All of them helping to promote the spread and adoption of economically sound and progressive ideas.

NOW, UNSELFISHLY, we offer to the Industry for the 1928 track construction season such an idea and naturally we back it with a slogan so that its value may by repetition come to have the wide attention it deserves.

1928 Track Construction will be on a Production Basis

UNSELFISHLY, we repeat because whatever type or design of track you may lay, mass-production methods will save you money.

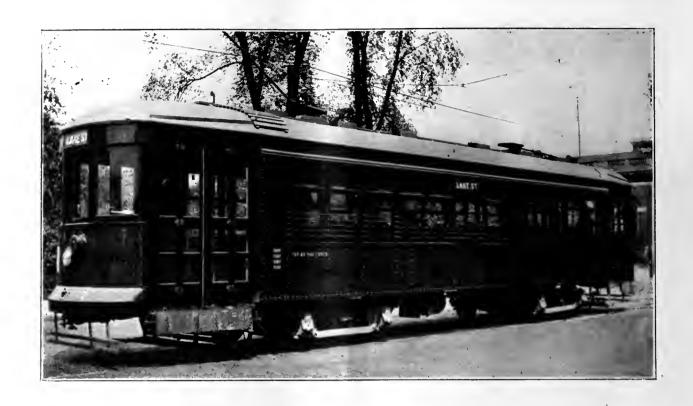
Drive no spikes with a maul!
Tamp no ballast by hand!
Shovel no material into concrete
mixer skips!
Handle no rail with rail tongs!

Excavate no track with picks!

LOOK UP! There's power over your head for track construction operations and there's a new slogan abroad in the Industry.

1928 Track Construction will be on a Production Basis

THE INTERNATIONAL STEEL TIE COMPANY CLEVELAND, OHIO



Appearance—Comfort—Light Weight —the trend of Modern Car Design

JUST as light weight and improved mechanical construction are necessary to reduce operating costs and maintain efficient operation, attractive design and riding comfort are vital factors in increasing revenue.

These features are embodied in the above car. The Cummings No. 62 truck contributes largely to the riding comfort.

CUMMINGS CAR AND COACH CO.

Successors to McGuire-Cummings Mfg. Co.

111 W. Monroe St., Chicago, III.

Street Railway Review



30 years ago—

An ad published almost 30 years ago in the Street Railway Review (later the Electric Railway Journal) stated rather immodestly that the Garton-Daniels Lightning Arrester was "always at the head—others follow." It is significant that after thirty years the direct current types of the Garton-Daniels Arresters remain unchanged in principle and are to-day the most widely used lightning arresters for the protection of electric railway circuits.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.



Present type of 600 volt Direct Current Arrester

N.B. Some years ago the Garton - Daniels Electric Company was consolidated with the Electric Service Supplies Company.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER

AND INDUSTRIAL ELECTRICAL MATERIAI



Automatic Signals by providing proper spacing of cars or trains, reduce trip time and enable more cars to be operated with consequent safety.

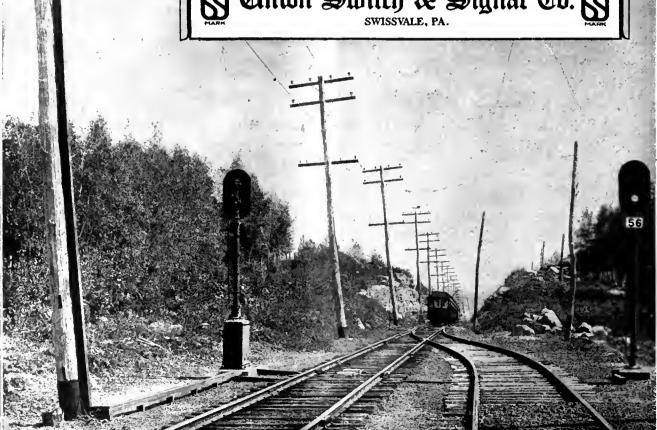
Interlocking installations at terminals and at grade crossings eliminate unnecessary stops and assure route continuity by means of signal indications.

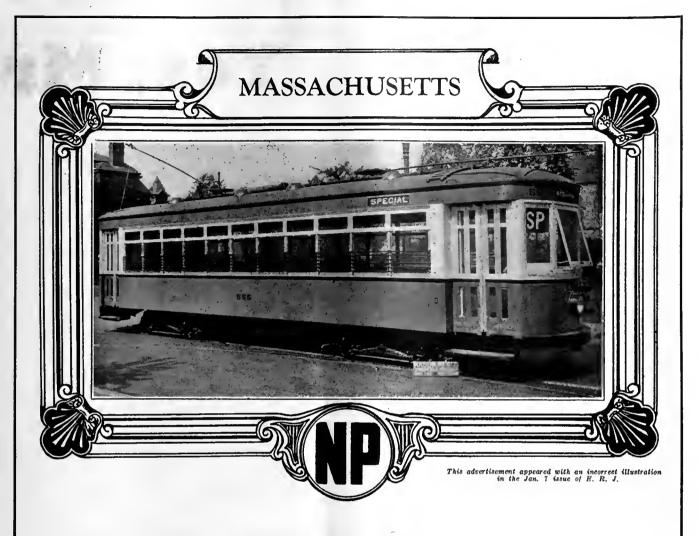
Highway crossing protective devices of the flashing light, automatic flagman, or audible type, or combination of same, are a dependable insurance which soon pays off the investment.

Power operated remotely controlled switches are being used economically to accelerate Electric Railway traffic.

These Systems are products of the







SPRINGFIELD TAKES TO TREADLES

FIFTY-ONE cars have been ordered or have been equipped with treadle doors within the last 12 months for Springfield, Mass. Treadle Doors are new in Springfield, yet they have already demonstrated their value as time savers.

NATIONAL PNEUMATIC COMPANY

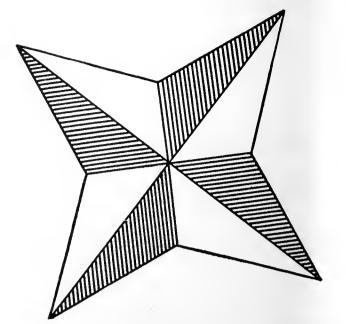
Executive Office: Graybar Building, New York

General Works, Rahway, New Jersey

CHICAGO 518 McCormlek Building MANUFACTURED IN TORONTO, CANADA, BY Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building

A



Yes, Mr.

These excerpts from an editorial in the Dec. 31st Electric Railway Journal tell a pointed story

Schedule Speeds Can Be Improved

SCHEDULE speeds on many electric railways have not seen improvement commensurate with the trend of the times or the demands of the public. While this is true of some large properties, it is particularly noticeable on the smaller systems. Unfortunately, it is in the small cities that the need for improvement is most apparent. ...

One of the standing complaints

of the railway patron is that while the street car is moving slowly and majestically along the street all the other traffic is passing by and leaving it in the rear. Even though it may be proved that the car gets to its destination only a minute or two later, that does not pacify the rider who is annoyed by the slowness of the car. After he has had his fill of it he buys an automobile. Soon he joins the ranks of the agitators who want the trolley tracks torn up.

Editor

and Magnetic Brakes will make higher schedule speed not only easy to maintain—but SAFE!

Obviously the electric car is in an entirely different position from that of the railroad train, in its relationship with other traffic. The fact that it nearly always operates on, or in close proximity to, busy highways means that it must hold its own with modern highway vehicles on the score of speed and braking ability.

The Cincinnati Duplex Air Magnetic Brake has been developed especially to meet the growing need for more rapid deceleration. Operating in conjunction with the regular air brake equipment through a standard M.28 valve, it will bring the average car to a stop from 30 to 35 per cent quicker than with air alone. The distance required to stop is reduced 22.5 to 46 per cent, and the magnetic brake operates almost equally well whether the track be wet, dry or greasy. Furthermore, the Magnetic Brake, as developed and perfected by Cincinnati, costs very little to maintain. The shoes are carried about $2\frac{1}{2}$ inches above the rail and are brought down into contact by air, eliminating the need for careful adjustment as on earlier systems.

Why not let us send you full details and estimates of costs for application on your property

CINCINNATI CAR COMPANY CINCINNATI, OHIO

CINCINNATI BALANCED CARS

The Four Features of
Balanced Design are
the Cardinal Points of
today's demand

From the broiling sun of Florida to the frost of Bangor, Maine...

TAMPA on the south, Winnipeg on the north; west to San Francisco, and east to Bangor, Maine...in 1927, engineers in 152 cities were using and recommending Carey Elastite System of Track Insulation.

It's climate-proof, this remarkable protection. Climate-proof, and it outlives the track itself.

Carey Elastite System of Track Insulation consists of a durable, asphaltic compound substantially reenforced with asphalt-saturated fibre preformed under heavy

pressure. Of course you will want to know more about this great traction improvement — about the lasting protection it affords electric traction lines. Write.

THE PHILIP CAREY CO.

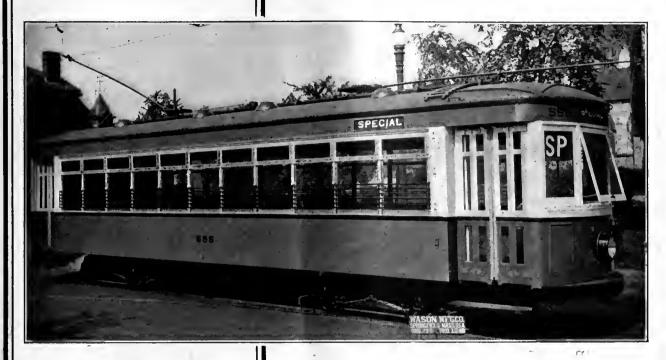
Lockland, Cincinnati, Ohio





"STANDARD"

STEEL PARTS



STEEL AXLES

WROUGHT SOLID STEEL WHEELS

CARBON and ALLOY STEEL FORGINGS

STEEL SPRINGS

forgings, in the hardest kind satisfy?

for service, then made on be expected?

faction What more can be expected?

steel.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

NEW YORK

BRANCH OFFICES PORTLAND RICHMOND

WORKS: BURNHAM, PA.

PITTSBURGH MEXICO CITY





"Conforming to the standards of ease and refinement set by the company for its patrons"—H&K Seats

That was the chief requirement to be met by all materials used in the eight new cars built for the Beaver Valley Traction Company. The H & K No. 300-A Leather Covered Seats—an attractive maroon in color—filled the bill exactly. They appeal to the rider's sense of refinement and his love of ease.

The equally important question of durability and life is also solved by H & K Seats. They are built to stand the hard abuse to which they are subjected in handling modern crowds.

The Hale & Kilburn line is unusually complete. You will find just the right seat for every car and bus requirement in the new Hale & Kilburn Catalog. Get one for reference.

HALE & KILBURN COMPANY

General Office and Works: 1800 Lehigh Avenue, PHILADELPHIA

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York
Hale & Kilburn Co., McCormick Bldg., Chicago
E. A. Thornwell, Candler Bldg., Atlanta
Frank F. Bodler, 903 Monadnock Bldg., San Francisco
C. S. Wright Co., 66 Temperance St., Toronto

T. C. Coleman & Son, Starks Bldg., Louisville W. L. Jefferies, Jr., Mutual Bldg., Richmond W. D. Jenkins Praetorian Bldg., Dallas, Texas H. M. Euler, 46 Front St., Portland, Oregon

Hale and SEATS

TRUCK TIRES STATES UNITED ARE GOODTIRES



Remarkable New Rubber Compound Offsets Effects of Heat Accumulation in Pneumatic Truck Tires

"Usconite"-a New Development of U. S. Tire Engineers—Brings Another Great Advantage to the

U. S. Royal Cord Heavy Service

EVERY truck operator who uses pneumatic truck tires knows how the constant flexing of the tire under load generates heat.

When heat accumulation becomes excessive the rubber loses its vitality and

tenacity.

Tread and carcass separation result. "Usconite"-the new rubber compound used in the Royal Cord Heavy Service Tire—prevents this trouble. "Usconite" transmits heat rapidly.

"Usconite" maintains its tenacious characteristics and vitality under high temperatures. Thus the tread holds fast to the carcass.

It has a strong affinity for cotton—making the plies hold firmly together—yet it permits great freedom of movement in the carcass. "Usconite" is one of the most important developments in heavy service pneumatic tire construction in years. Get this greater mileage in the Royal Cord Heavy Service.



United States Rubber Company Trade Mark

A U. S. Truck Tire for Every Purpose

In addition to the Royal Cord Heavy Service Tire, there is a U. S. Truck Tire for every purpose. U. S. High-Size Cushion, U. S. Cushion, U. S. Twin Cushion, U. S. Demountable Cushion and U. S. Industrial Truck Tires.

U.S. Twin Cushion



NITED TRUCK TIRES





G-E Automatic Sectionalizing Switch

Birmingham Electric Co. Boston Elevated Railway Co. Butte Electric Railway Co. British Columbia Elec. Ry. Co., Ltd. Calgary Municipal Railway Cedar Rapids & Marion City Railway Co. Cleveland Railway Co., Conestoga Traction Co. Dallas Railway Co. Denver Tramway Co. East St. Louis Railway Co. El Paso Electric Railway Co. Empresas Electricas Asociadas Fresno Traction Co. International Railway Co. Kansas City Railways Co. Key System Transit Co. Knoxville Power & Light Co. Lake Shore Electric Railway Co. Los Angeles Railway Corp. Lynchburg Traction & Light Co. Market Street Railway Co. Municipal Railway of San Francisco, Cal. Newport News & Hampton Ry., Gas & Elec. Co. New York State Railways Niagara, St. Catharines & Toronto Ry. Co. Northern Obio Traction & Light Co. Northern Texas Traction Co. Omaha & Council Bluffs St. Ry. Co. Pacific Electric Railway Co. Pacific Gas & Electric Co. Philadelphia Rapid Transit Co. Pittsburgh Railways Co. Puget Sound Power & Light Co. Rio De Janeiro Tramway Lt. & Pwr. Co. Roanoke Railway & Electric Co. San Diego Electric Railway Co. Southern Colorado Power Co.

ALL THESE properties and more are using G-E Automatic Sectionalizing Switches as a means of saving feeder copper and improving feeder distribution.

Texas Electric Railway
Tri-City Railway Co. of Iowa
United Railways & Electric Co.

United Traction Co.
Virginia Railway & Power Co.
Wheeling Public Service Co.
Winnipeg Electric Co.

These switches equalize voltage conditions and provide for the entire system the maximum usefulness of the feeder-copper capacity. In addition they act as automatic breakers to cut out any section where there is a "short" or dangerous overload, re-establishing connections immediately upon the return of normal conditions.



Only by the use of up-todate equipment that cuts down costs can electric railways earn a fair return in these trying times. G-E Automatic Sectionalizing Switches have proved a real help in lowering costs on scores of properties.



Modern Equipment Standards

370-3

GENERAL ELECTRIC GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, February 4, 1928

Number 5

The Engineer in the Rôle of Prophet

EAN HERMAN SCHNEIDER of the College of Engineering and Commerce of the University of Cincinnati has prepared a prophesy which has been placed in the cornerstone of the new Union Central Life Insurance Building in Cincinnati, dedicated on Jan. 16. He would be the last to claim infallibility as a prophet, the most difficult of rôles. He knows, of course, that whatever wealth of progress science may bring out of its bag of tricks, man 100 years hence will not be different from us fundamentally, any more than we are different from mankind of 5,000 years ago in our passions, our vanities, our personal ambitions, and all other inherent human elements of which our spirits are compounded. But he is led to the belief that during the next hundred years science, religion, philosophy and even enlightened selfishness will walk together with greater surety toward the destiny for which mankind has been groping and blundering down the ages.

Just such prophesies are needed ever so often for the stimulation they contain. Ever since man became a reasoning animal fanciful, indeed, has been the first conception of the oddity that later has become reality. The whole gamut of history might be run to prove the point, but it is only necessary to mention Fulton, Edison, Bell, Marconi, Ford, Eads and Westinghouse to bring to mind the names of a myriad of other men whose first efforts were met with the smile of derision often from contemporaries of the pioneer. Many there are who always see things through a glass darkly. To them there is no remedy for the ills by which they are oppressed. They often have great fortitude, but very little foresight. And they have small patience with the advocates of change. They forget that progress should be imputed very largely to the builders of Castles in Spain, and that "Without Vision the People Perish."

Chicago's Anti-Parking Ordinance Benefits the Public

MUCH has been said in recent years about the evils and injustice of automobile parking in busy city streets. But though the facts are recognized, there has been practically no relief. The authorities in too many of our large cities have been afraid to offend someone, and congested business streets are still used by automobile owners for the free storage of their cars.

But in one city, at least, a change has come. Chicago is showing the way. Since Jan. 10 all parking has been prohibited in its central business area between 7 a.m. and 6:30 p.m. on Mondays to Fridays inclusive, and between 7 a.m. and 3 p.m. on Saturdays. The results to date are told by E. J. McIlraith in an article in this issue.

Most interest perhaps will be felt in the effect on the number of customers and the sales in the retail stores within the district. It is from the owners of such stores that most of the opposition to non-parking ordinances in the past has come. The experience in Chicago is that there has been no appreciable effect from the ordinance. This result might have been predicated from a previous analysis that only about $1\frac{1}{2}$ per cent of the patrons of these stores came in automobiles. But it is satisfactory to have direct testimony on this point of effect on sales and patrons.

It is still more encouraging to learn of the gains in increased usefulness of the streets. Vehicles are moving with a saving in time of more than 20 per cent during the evening rush hours and of more than 30 per cent in the business day before 4:30 p.m. Street car schedules are much more regular. Pedestrians move more freely and with a greater sense of security. All these benefits have been obtained, of course, without limiting the use of the street to traffic in any way. Taxicabs, buses, private cars and commercial cars are permitted to operate as before. Passenger vehicles can stop to receive and discharge passengers as they always have done. It is simply that they cannot block the streets by using them for storage purposes.

The Chicago example should be followed by other

Tacoma Pays the Penalty of Its Badgering Policy

RECEIVERSHIP for the Tacoma Railway & Power Company appears to be inevitable. This is a situation especially to be deplored, since mistaken political policies have had a good deal to do with forcing the company to the wall. For some years the conditions under which the company was required to operate were very bad, particularly during the term of office of the late Mayor Fawcett, who, in gloating over his anti-corporation attitude, inflicted the jitney upon the company. More recently, under Mayor Tennant the situation has been bettered, but the change appears to have come too late. As the present Mayor sees it, a prompt and orderly solution of the railway situation appears to be at hand. He has not been more specific than this, but his attitude toward the matter, and his attendance in New York at the meeting at which the affairs of the company were considered by its security holders would appear to augur well for the future.

The vociferous oppositionist appears, however, not to be stilled, since S. A. Perkins, newspaper owner, has just declared that if Tacoma had acquired its railways fifteen years ago "even paying five times the price they were worth, the city would be twice the size it is today." As he pretends to see it conflict at the City Hall with the railway would have been avoided.

Here, of course, is one of those half truths more deadly than the truth itself. In the first place, the statement about the probable growth of the city is clearly imaginative. Neither Mr. Perkins nor anybody else is in a position to say definitely what would have happened. But even granting that he is correct, could not Tacoma with

results far more lasting to itself have achieved the same end under a program which would have made it possible for the company to carry on as it desired? As for the benefits of the avoidance of conflict, they would have been unmistakable. But they could have been obtained under

private ownership. Certainly, municipal ownership would not have helped here, not even at the City Hall. If there is any system that has been in the public eye more than the municipally owned one in Seattle, ELECTRIC RAILWAY JOURNAL does not know about it. It has been a case of continual conflict there. If wise, Tacoma will keep the situation in Seattle constantly in mind, and then proceed to effect a settlement of its railway problems in a business-like way that will take into account the drafting of an agreement for operation which will be sufficiently liberal in its terms to permit the present management to carry on as it is qualified to carry on. Hard hit as it is, the Tacoma road can be successfully rehabilitated, but only if the ideas on the part of the representatives of the public who deal with the company are so revised as to discard practically all of the motives that have actuated municipal adminis-

Adequate Fares Essential to Service Improvement

tration there in recent years.

LIKE straws in the wind, there come these days from every quarter of the country, news dispatches regarding the upward adjustment of local transportation fares. Houston and Atlanta recently joined the rapidly growing list of cities in which a ten-cent base fare for a street car ride has been established. Dallas, Baltimore, and several other communities are making a move in the same direction.

Supplementing this trend toward equitable car fares, there is a similar undercurrent of thought in favor of putting bus fares on a basis which will permit this newest public transportation agency to stand on its own feet financially. To do that, buses must collect a rate of fare commensurate with the cost of giving supplementary transportation service, which in many instances is of a character distinctly different from that given with cars.

It is now generally agreed that the rate of fare in many initial bus applications was set too low. As a consequence the general idea was permitted to grow in the public mind that a bus ride and a street car ride can be given at approximately the same fare levels. There is no need here to review all of the causes for this situation. Suffice it to say that in some instances over-enthusiasm and an ambition on the part of some bus men to replace street cars, led to many initial installations at rates of fare that were too low to permit the development of bus service on an economically sound basis. In other instances buses replaced jitneys that consisted of nondescript small touring cars run by irresponsible operators and charging rates of fare below the cost of operation of a responsible, organized transportation service. The railway had the choice between operating buses at rates comparable with those charged by the jitneys, or of sitting back and permitting these "mosquito fleets," operating only on lines representing the cream of traffic, to sap the revenues of the street railways to the point where the entire transportation service was in danger of collapse. In still other instances, there existed the threat of competition by private bus operators. Self-preservation dictated the acceptance of almost any fare arrangement which would permit the street railway to make a move toward co-ordinating the rail and rubber tire transportation services.

Many cities are now awakening to the fact that the car riders of the community are paying for bus losses attributable to inadequate rates of fare for bus riders. This situation is receiving serious consideration in those cities that have had sufficient experience with the operation of buses on a large scale to get a fair approximation of the actual operating results. As a consequence the idea that bus operation should stand on its own feet financially seems to be spreading. It is obvious that this new form of public transportation cannot be developed to its logical place in the scheme of public services, unless it is permitted to become a financial asset and not a liability.

There are several outstanding examples of operations which, while originally started at street car rates, are gradually moving toward higher fare levels. As the number and length of bus lines is increased it is important that the 10-cent upper limit for city bus fares be broken before it becomes too firmly fixed in the public mind. At present there are lines in several cities giving a preferred class of service and charging a 25-cent fare. When the intermediate range of 15- and 20-cent rates is generally applied for all services which cannot be carried within the 10-cent limit, bus development will have burst one of its present restrictions and may be expected to move forward more rapidly than ever.

In the operation of both cars and buses, therefore, common sense economics and a clearer understanding of fundamentals are leading toward the establishment of fares that promise widened opportunity for really merchandising public transportation service. As the rates of fare are brought to levels that offer fair opportunity for reasonable profit railway managements may be expected to attack with increased zest and determination the many problems incident to providing really satisfactory public transportation service.

What Makes the Street Car Slow?

WITH the railroad station about a mile away, a business man had fifteen minutes to catch a train. He wavered between taking a taxicab and taking the street car. From past experience he knew that the taxi usually made the trip in five minutes and the street car in seven. He felt that he had sufficient time, so he decided to take the car and save the difference in cost.

But he hadn't allowed for the attitude of the management of that particular street railway. The company was more interested in getting his nickel than in giving him his money's worth for it. He boarded the car and paid his fare. Then he noticed that the conductor was having trouble with the fare box. In front of one of the company's depots the car stopped and an inspector got on. Conductor and inspector examined the fare box and discussed the situation. The car did not move. At the conclusion of an apparently complicated bookkeeping operation, the inspector removed the defective box and disappeared into the building. Still the car did not move. The passengers fretted and fumed. Presently the inspector reappeared with another fare box, which he installed in its appointed place on the platform. Another complicated bookkeeping operation ensued. Finally the car moved on.

Seven minutes had been lost by this procedure. The

car was late now. At every corner more passengers boarded the car, making it later than ever. Instead of the usual seven minutes to reach the railroad station, the trip took seventeen. The hurried business man reached the train shed just in time to see the attendant taking down the sign which had marked the train he missed. He had lost his train and the street railway had lost a patron forever.

Reasons there are, of course, for practices of this kind. The passenger's nickel is the life-blood of the railway. Revenue must be protected and all that. But in the last analysis the best way to protect the revenue is to render service that satisfies the customer.

New York Company No Longer the Silent Victim

QUITE within its rights is the Interborough Rapid Transit Company in its appeal to the Transit Commission for a 7-cent fare and in its statement indicating its purpose to carry the matter to the courts. This is not the first time that the company has sought similar relief, although on the previous occasions it took no steps other than its appeal to the commission. They were lost first by changes in administration and second by changes in which the Legislature played battledore and shuttlecock with fare control provisions.

The flood of comment that has followed the company's announcement made it appear that the change in rate might be made over night. Nothing, of course, is farther from the fact. Despite this, however, journalistic advocates without number recommend further temporizing. Even the New York *Times* says that both sides have far more to gain through patient dealing with each other than through blasts and counter blasts, lawsuits and counter law suits. This would be good advice if the recommendation had not already been nullified by the course of the city under the Hylan administration, by the inaction of the present city administration under Mayor Walker and by the still more recent belligerent attitude of the Transit Commission under the procedure of its counsel whose every move seems to be a threat.

The record of fare increases on electric railways elsewhere throughout the country testifies to the widespread recognition of changed economic conditions. Even the public directors of the company who voted in the negative on the issue are convinced that satisfactory service is impossible without an increase in fare. The position of the company is that it does not desire to charge more or less than the rate of fare which will conservatively enable it to pay proper wages and meet present-day operating costs, together with an adequate return upon the property devoted to the public service. This is essential that its credit may be restored and that it may procure new capital sufficient for improvements. In short, it seeks neither more nor less than a reasonable fare, based on elements recognized by the courts and subject to revision downward or upward as the costs and conditions justify. In this respect the Interborough is modesty itself when contrasted with most of its critics.

Summarized, the plea made by the company to the Transit Commission is that the rate regulatory provisions of the law entered by implication into the terms of the leases, agreements and authorizations covering the subway and elevated rapid transit railroads; that they formed part of the obligations of those instruments, and that they were notice to the parties thereto that those

instruments were coupled with a provision that the Legislature, in the exercise of its powers, either itself or acting through another might regulate the rates thus fixed, and particularly, with the provision of the statute that a common carrier, such as the Interborough, was allowed by law to put into operation a new schedule of just and reasonable rates and charges to be made for service, upon notice, filing and publication, as provided by law.

In its legal phases the matter is not so easy to follow. The company has equipped and is operating under contract calling for a 5-cent fare certain lines that the city built. In the event that the case goes to the courts from the commission the railway will put in a plea of confiscation. It is safe to say that most of the critics of the company would long since have resorted to the course upon which the company now enters had they been confronted with a set of conditions similar to those with which the Interborough has had to contend. In matters of this kind it makes a great difference whether one is a spectator of them or one of the victims.

Progress of Simplified Practice Continues

GROWTH of simplified practice as a means of eliminating waste in industry has continued during the year. This is indicated by the completion of eighteen new recommendations, thus bringing the total number of projects to 80, according to a review of the past year's activities of the Commercial Standards Group of the United States Bureau of Standards by Ray M. Hudson, assistant director in charge.

This paper has from the outset been in favor of the simplified practice movement, since it has been shown that it effects economies and facilitates the work of maintenance. That simplification yields benefits sufficient to attract manufacturers, distributors and consumers alike is indicated by the high degree of adherence shown by reviews of fifteen of the simplified practice recommendations already promulgated. According to the report acceptors representing an average of nearly 83 per cent of the total volume of the industries affected are following the simplified practice schedules. Associations indorsing the recommendations grew from 686 to 898 during the year while individual concerns went up from 2,775 to 6,676. This means that an increasing number of industrial purchasers are specifying simplified lines when buying because they find that such items usually are more readily obtained, their quality is better, and prices are lower.

Mr. Hudson cites many specific instances where simplified practice has made savings. The money value ranges from small sums up to many thousands of dollars. Not the least of the savings reported are due to the smaller stocks that need be kept on hand and the greater ease of handling the stocks.

In the transportation industry, the simplification program still can be carried much further than it has been so far. Many properties have found that the number of stock parts can be reduced greatly without detriment to the finished work and with all the advantages cited above. The program should continue to receive attention of those involved and every effort should be made to carry it as far as practicable. The savings to each company are so great that they cannot be overlooked by anyone who has a regard for keeping costs down.

Chicago Prohibits Parking

in Its Central Area

Before adoption of present ordinance a few individuals hampered free movement of many thousands. Under new law, vehicle speeds have gained from 15 to 30 per cent and usefulness of the streets has been greatly increased

> By E. J. McIlraith Staff Engineer Chicago Surface Lines

ARKING in Chicago's central business district is banned by an ordinance that became effective Jan. 10. That it will be continued seems certain. Various measures will be applied to determine the success of the change, and some variety of opinion will result. People differ widely in opinion on the value of each of our best assets. There will even be a variety of opinion about the beauties and gladness of heaven. Opinions of individuals are not always well established by adequate and relevant facts.

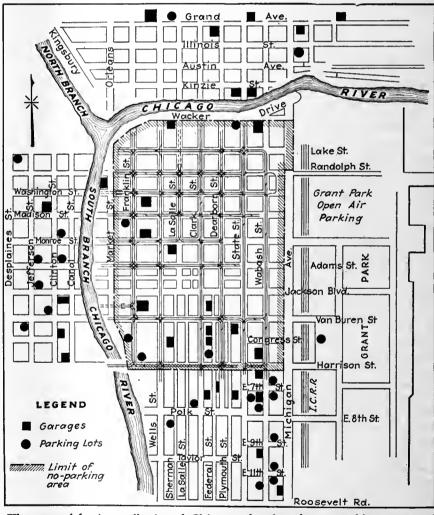
The primary purpose of the regulation is to permit the growth and development of Chicago. It is to encourage the concentration in Chicago of the administrative, financial, advisory and engineering organizations and of great mercantile and sales corporations that are finding this city the most desirable strategic location from which to direct the business of the great area which is coming to be tributary to Chicago.

The growing central district in Chicago is fast changing to a concentrated group of huge office buildings built about streets that were laid out for a The usefulness of frontier town. those streets constantly must be kept adequate to serve conveniently the needs of the great army of 900,000 people who now daily move into the district and travel about within that area.

Unless it is apparent that regulations can be made from time to time that relieve materially the threatened congestion and prevent the occurrence of confusion on the city streets, confilence cannot exist in the future of

this area that soon promises to be more valuable than that of any similar area in any city. Without such confidence the rapid surge forward of the last five years will be checked and finally stopped.

The present enthusiasm to locate in Chicago, and the urge for magnificent new buildings closely arranged, con-



The central business district of Chicago, showing the no-parking area and the location of garages and parking spaces

Under the present ordinance parking is prohibited in the area inside of the shaded line between 7 a.m. and 6:30 p.m. from Monday to Friday inclusive and from 7 a.m. to 3 p.m. on Saturdays. Wacker Drive, with its two levels, adds parking space for 1,700 cars. Parking

space on streets could serve only 1,157 cars at one time.

venient to each other, are dictated by sound economic reasoning. Great building activity will continue if the application of modern principles of city development can be expected from Chicago's city government so as to keep pace with such concentration of building activity.

On Manhattan Island two major business centers exist,

because lack of street space and lack of adequate transportation threatened to throttle business in the lower end of the island. The difficulties and tendencies on Manhattan are not at all present in Chicago, where the land values are becoming higher than in New York, and where the original central area of the city is still the most valuable. There is ample opportunity for the development of a sufficient number of streets and adequate lines of convenient transportation to serve the great central area of Chicago for the next fifty years.

Three major steps in recent years have steadily produced increased street capacity and improved convenience for all the people using the streets. In 1924 rerouting of street cars and abolition of left turns of vehicles over a large area made a remarkable street improvement. In 1926 an entirely new, and as yet the best, system of signal control again added new capacity and increased the convenience and safety of the streets. Now in 1928 another great step has been made, and again a new confidence has been established that there are always new ways to prevent confusion and congestion.

The next major improvements that can be made are already clear and will be effective in due time before the results from the present expedients have been absorbed by the growth in street traffic. Chicago has been leading all large cities in avoiding excessive congestion in its principal center.

Exact figures to express the degree of improvement as a result of the no-parking regulation can be obtained only as a result of compilations of data on many factors. Such data as are now available measure decided improvements. Vehicles are moving with a saving of time averaging more than 20 per cent in the rush period of the evening and more than 30 per cent in the business day before 4:30 in the afternoon. Street cars are averaging speeds that save 15 per cent of their passengers' time. Better than the time saving is the improved regularity with which the street cars move through the streets. This means more uniform spacing for the cars along the entire length of each line. All parts of the city served by lines entering the loop area are bound to get better

Pedestrians are moving more freely and with a greater sense of safety. There is better vision for drivers and pedestrians, less confusion and crowding, fewer conflicts and dangers.

Merchandise vehicles can move with freedom and can easily reach the curb for loading and unloading. Taxicabs no longer need to collect passengers or stop to unload and receive fares on crosswalks or in a line of moving traffic. There is freedom on practically all streets at all times. Where points of difficulty still remain it is only because some necessary regulation of movements has not yet been made or further signal adjustment is needed to meet the changed traffic flow.

The effect on the volume of shopping, banking and restaurant business is, of course, important. It is early to have reliable figures. It may have been unfortunate that this regulation became effective at one of the dull periods of the winter season. It is a quieter year in business than a year ago, and the second week of January is a period of lull after the readjustment period that begins after Christmas when big reduced price sales are advertised that attract many shoppers.

TABLE I-COMPARISON OF PEDESTRIAN COUNTS IN DISTRICT, MADE BEFORE AND AFTER PLAN WAS EFFECTIVE STATE STREET, BETWEEN MADISON AND MONROE, 11:30 A.M. TO 6 P.M.

		est Side of S	treet	——Еа	et	Both	
	N. B.	S. B.	Total	N. B.	S. B.	Total	5 ides
Nov. 25, 1925	30,000 35,115	30,375 37,764	60,375 72,879	18,856 27,602	16,400 23,546	35,256 51,148	95,631 124,027
Per cent increase	17.0	24.2	20.8	46.4	43.6	45.1	29.7
CLARK STREET, B	ETWEEN	MADISON	AND WAS	HINGTON	12:45 PM	TO 6 P.M	

	←-We	st Side of St	reet	—Eas	t Side of Str	eet	Total Both
	N. B.	S. B.	Total	N. B.	S. B.	Total	Sides
Dec. 15, 1925	7,475 11,404	7,150 10,872	14,625 22,276	9,1 7 5 10,176	9,356 8,597	18,531 18,773	33,156 14,049
Per cent increase	52.6	52.1	52.3	11.0	9.2*	1.3	23.8

^{*} Indicates Southbound decrease.

The most convincing data to date are comparisons of pedestrian counts. All counts were made on days having seasonable weather, but those taken previously were made during very active business periods. Even though January is normally quieter than November and December the number of pedestrians counted on the streets, after this ordinance became effective, was tremendously greater than at a period about two years previously when business was considered excellent. The present January depression may have decreased the purchasing power of the individuals, but it is apparent that a greater number of individuals are available on the streets as potential customers.

Interesting figures are those of store-door counts which have been taken at those stores whose representatives were loudest in condemnation of the plan. These checks show conclusively that there is no difference in the number of customers beyond that to be expected as a variation from day to day.

TABLE II-ONE-DAY COUNTS OF CUSTOMERS IN REPRESENTATIVE SHOPS IN DISTRICT, MADE BEFORE AND AFTER PLAN

WAS EFFECTIVE		
Establishment	Before	After
Furs and apparel	371	357
Book store	2,008	2,018 3,218
Restaurant and bake shop	3,307	3,210

There can be, however, no appreciable change at once due to this new regulation. Over a period the effect must be to the advantage of all.

SMALL MINORITY DELAYED MOVEMENT OF MANY

Parking has been a decided and major factor in creating street congestion. Most of the streets are either 48 ft. wide or 38 ft. wide between curbs. With 8 ft. used on either side for parking on 48-ft. streets only two-thirds of the original width was left for movement while on the narrower streets only one lane was available in each direction. Since the curb lane was occupied by parked vehicles much loading and unloading of merchandise and passengers was carried on from vehicles standing alongside the parked vehicles. Further, the maneuvering of vehicles into and out of cramped parking spaces delayed all movements along the street.

Out of 892,000 people entering the Loop per day only 27,000 or 3 per cent were using parking space at the curb, whether in prohibited areas, or at illegal time, or correctly, as noted by actual counts taken between 10 a.m. and 6 p.m.

Only 1,157 vehicles can park legally at any one time in the Loop District and since 1922 parking has been prohibited by ordinance between 7 and 10 a.m. and between 4 and 6 p.m. on all streets having car lines, although the ordinance is not well enforced. Parking has





On Monroe Street before and after the parking ban

The view at the left was taken looking west on Monroe at Dearborn on Jan. 6, 1928, at 11:37 a.m.

The one at the right was taken from the same location on Jan. 10 at 11:47 a.m.

also been prohibited on Jackson and on the west side of Michigan Avenue. The maximum number of vehicles that legally could use the available space in one day, under the limitation of one-half hour, would be 18,222. Counts show that only 78 per cent of the vehicles parking have been private automobiles, so the number of these which could have parked under the old regulations would have been 14,213.

Only 17 per cent of all the automobiles driven into the district could be given parking space at the curb, the other 83 per cent of drivers found ways of using automobiles without standing on the public streets. Does it not seem reasonable that the 17 per cent should be required to do likewise when their vehicles are so seriously in the way and create congestion for the other 97 per cent of street users?

On State Street between 2 p.m. and 3 p.m. of a typical day 22,676 people were counted walking on both sides of the street between Monroe and Madison. For the same hour in August a count showed that with all the parking space used in the block and with more than 90 per cent of the vehicles private automobiles only 122 people were served by parking. In other words out of

the 22,676 people on the sidewalk only 122 came from parked cars that occupied a space 8 ft. wide along each curb.

On Clark Street between Washington and Madison in the same hour 8,259 people were walking the sidewalks while only 94 people were served by the parking space, although it was all in use. Can such use be justified in a busy district?

Not all blocks had so much parking space available as the two above mentioned under the restrictions in force before Jan. 10. Out of a total curb length in the loop of 57,958 ft. only 17,352 ft. was left for parking under the ordinances previously in effect. More was being used and the large number of cab stands were equivalent to parking in using curb space. But many business houses had obtained "no parking" zones in front of their buildings—the alderman for the district has had 144 ordinances passed creating such restrictions. Yet, in spite of this constant reduction in available parking space due to individual action of the business men some now feel that clearing the streets of the rest of the parking is a serious hurt to business. It is fear rather than reasoning that prompts the notion.





Views on Dearborn Street in the heart of Chicago's Loop district

The views are looking north on Dearborn Street at Adams. The one at the left was taken on Jan. 6, 1928, at 12 noon. The one at the right was taken on Jan. 10 at 11:40 a.m.

1926

The abuse of the parking privilege was always great, since it was impossible to keep a record on the time vehicles arrived and left. Table III shows the results of an unofficial count of vehicles in the central section, where curb parking was limited to a half-hour period.

TABLE III—TIME THAT VEHICLES USED PARKING SPACE IN CONGESTED DISTRICT BETWEEN 10 A.M. AND 6 P.M.

(The total number checked was 19,447. Of this number 78 per cent were private automobiles.)

	Number
Time Parked	of Cars
Less than 40 minutes	16,066
Between 40 minutes and 60 minutes	1,364
Between 1 hour and 2 hours	1,208 348
Between 2 hours and 3 hours	
Between 3 hours and 4 hours	171
Between 4 hours and 5 hours	116
Between 5 hours and 6 hours	58 56
Between 6 hours and 7 hours	
Between 7 hours and 8 hours	60
Total number observed	19,447

Of those automobiles which parked more than 40 minutes, 86 per cent were private cars. In other words, the selfish user was saving himself 50 cents or less for garage space, was leaving his car exposed to the weather and to the hazard of bumps and scratches, and was causing the other citizens a wastage equal to many dollars, due to his misuse of the most valuable space in the city.

Interviews with 96,082 people showed the proportions using curb parking space were as shown in Table IV.

TABLE IV—SHOWING NUMBER OF PATRONS INTERVIEWED AND NUMBER ARRIVING IN PARKED AUTOMOBILES

Establishments	Total Patrons Interviewed	by Automobiles Parked at Curb Number	Per Cent of Total
Department stores	. 68,621	1,013	1.47
Office building	9.432	167	1.77
Banks	8,421	144	1.71
Musical Instrument storea		61	2. 29
Furniture stores	2.378	45	1.88
Shoe stores		32	3.02
Restaurants		41	1.69
Book stores		2	1.74
G14-4-1	04.002	1.000	1 67
Grand total	96,082	1,505	1.57

As will be seen, only 1.57 per cent arrived in automobiles that parked at the curb. Can any merchant measure the effect of these few when his daily variation of business is much greater?

There is garage space available for all who wish to park within or immediately adjacent to the Loop. Even if each person who used curb space were to put his car in a garage in this immediate vicinity there would be a considerable amount of vacant space left, and more garages are being built.

The streets in this area seem to have lost much vehicular traffic. They look rather like a former holiday. Yet, counts of the vehicles now operating in the midwinter period as compared to summer conditions, do not indicate any material change in the total number. There are almost as many private automobiles as ever in spite of the decreased use that is made of automobiles in cold weather. Many more can be operated because of the increased street freedom that has been created.

TABLE V—CHECK OF MOVING VEHICLES ON FOUR REPRESENTATIVE STREETS OF CENTRAL DISTRICT, MADE
BEFORE AND AFTER PLAN WAS EFFECTIVE

	Street Cars	Private Autos			Wagons	Tota	
July and August, 1926	*2,399	13,882	3,523	9,814	858	28,077	
Jan. 30-31, 1928							
Per cent increase		5.3	+13.7	+11.4	-10.9	+2.8	

^{*} One of these streets has no car tracks.

Automobile owners have not been hurt, but automobile usefulness has been improved and the comfort of driving much increased. Street capacity has been much increased. Costs of and delays in the delivery of merchandise have been greatly cut. Street car passengers can get to and from safety zones with much greater comfort and can get better car service at better speed.

Pedestrians have much better visibility, more room to move and better safety.

Business cannot be hurt noticeably, even if the most pessimistic view were taken. Indeed, in all cases it must soon show real improvement because the central district is a better place for all who come there.

The prestige and promise of future greatness of the entire city of Chicago is enormously promoted by this step toward preserving freedom and convenience of communication in the central business district. This deserved reputation for constructive adjustment to meet growing needs will create real confidence that this city can continue to grow until it is the greatest in the country, and the most convenient one in which to do business.

Index Numbers of Electric Railway Construction Costs

The relative costs of track construction by years is analyzed. Greater productivity per hour of track labor found

DEVELOPMENT of index numbers of public utility construction costs, with particular reference to electric railway track costs, is discussed in an article which appears in the November issue of the *Journal of Land and Public Utility Economics*. It is by Paul Jerome Raver, valuation engineer. He points out that

TABLE I—RELATIVE PRICES OF TRACK MATERIALS

Contract Prices, Delivered to Yard—1913=100 Per Cent

Classification 1913 1916 1919 1922 1925

Rail-high tee and girder	100.0	121,8†	. 169.5†	154.4	147.9	147.9
Rail-low tee	100.0	107.7	157.3	132.6	141.5	140.4
Fish plates	100.0	114.5	27 0.0	187.8	258.9	258.9
Tie rods	100.0	137.1	200.0	130,3	144.2	148.8
Tie plates	100.0	114.6	133.6	79.2	105.9	93.7
Special rail fastenings	100.0	182.5	259.3	187.5	205.3	205.3
Hook-head spikes	100.0	146.9	226.3	156.2	181.2	181.2
Ties	100.0	111.8	195.11	186.3	209.9	216.6
Torpedo sand	100.0	85.5	113.6	146.9	136.4	136.4
Crushed stone	100.0	92.4	130.4	244.6	188,0	179.3
Portland cement	100.0	0.1دا	190.0	194.0	205.0	195.0
Granite paving blocks	100.0	102.9	120.1	159.3	164.2	164.2
Vitrified brick, paving	100.0	124,7†	171.1†	174.9	147.3	143.5
Creosoted wood blocks	100.0	107.3	169.3	152.0	165.3	168.3
Hauling excavated material*	100.0	129.2	230.8	430.8	476.9	476.9
* Yearly contract.	† 1	Vone pur	chased; n	arket pr	rice used	i.

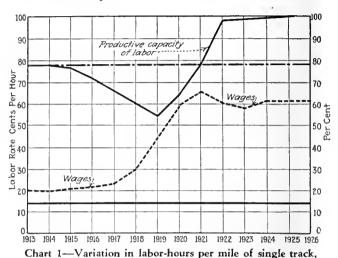
the street railway industry lends itself particularly well to the making of such index numbers, because the construction side of the industry has been fairly well stabilized for a number of years. But he warns that too much should not be expected of any index number.

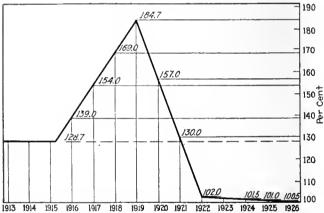
In the present study approximately 95 per cent of the total revenue track on streets was considered a fair sample, and the various types of track construction were taken in approximately the same proportion. Of the total sample, 93 per cent is paved and concreted construction. The principal paving material is granite block, with creosoted block, brick and concrete making up the balance in varying proportions.

Overhead charges were excluded because they are usually applied as a percentage of the total valuation after this had been determined. Some minor items were

also excluded as affecting only the fifth significant figure of the index number. These small items also, it is believed, will produce errors which are compensating rather than cumulative. The hauling of excavated material was included under material rather than under labor, as it is usually handled by contract. Some other items were excluded, because their installation has been confined to a relatively short and recent period. Steel ties are an example.

The relative prices from 1913 to 1926 inclusive of





1913-1926 (1926 = 100 per cent)

Chart 2—Productive capacity of track labor (1926 = 100 per cent) and labor rate in cents per hours, 1913-1926

the fifteen principal items used in track construction are given in Mr. Raver's article. A portion of the table is reproduced in Table I. The value of each item in the total track structure and in the composite index number of track material for the same years, is also published. These figures are reproduced in Table II. The author

TABLE III—TRACK LABOR, 1913-1926—AGGREGATE LABOR COST OF TOTAL TRACK SAMPLE

Based on: (i) Aggregate labor-hours in 1926 taken as constant for each year (37,584,601).

(2) Productive capacity of labor with 1926 taken as 100 per cent (column 6).

	1	2	3	4	5	6	7
	Average Rate Per Hour, for	r			m 1	a	
	Construction		Cost of	D 1	Total	Cost of	
	Crewa,	No. of	Labor	Produc-	No. Hrs.	Labor	Index
Year	Including,	Wages	(col. 1 X	tivity	Based on	(col. I X	No. of
	Foremen,		37,584,601	of Labort		col. 5)	Col. 6
	Watchmen,	100)	(millions)		Efficiency in	(millions)	
	Pavers and				1926. Cbart I		
	Laborers*						
1913	\$0.20	100	\$7,5169	77.682	48,382,657	\$9.6765	100
1914	0.191	97.5	7.3290	77,682	48,382,657	9.4346	97.5
1915	0.204	103.3	7.7676	76.924	48,859,981	10.0979	104.4
1916	0.21	105.0	7.8928	71.943	52,242,595	10.9709	114.3
1917	0.224	112.5	8.4565	64, 936	57,880,286	13.0231	134.6
1918	0.291	148.3	11, 1502	59, 172	63,517,976	18.8439	194.7
1919	0.444	217.5	16.3493	54, 136	69,426,275	30.2004	312.1
1920	0.59	295.0	22, 1749	63, 695	59,007,824	34.8146	359.8
1921	0.654	327.5	24.6179	78.125	48,108,289	31,5109	325.6
1922	0.601	302.5	22.7387	98,040	38,336,293	23, 1935	239.7
1923	0.57	287.5	21.6111	98.523	38,148,370	21.9353	226.7
1924	0.61	305.0	22.9266	99.010	37,960,447	23, 1559	239.3
1925	0.61	305.0	22.9266	99.503	37,772,525	23.0412	238.1
1926	0.61	305.0	22.9266	100.0	37,584,601	22,9266	236.9
•		202.0			27,201,001	/200	250.7
	Chart 1.		10	Chart II.			

says the weights given by him to the different factors apply during the period mentioned and will continue to do so for many years to come, unless companies undertake an extensive reconstruction or extension program.

In his compilation contract prices were used, except in a few cases where they were not available. In these instances the relative market prices were used to interpolate the contract prices. Savings from cash discounts were not considered. The cost was that laid down in the company's store yard. The cost of hauling the material to the job was included in the labor hours analysis.

FACTOR OF LABOR PRODUCTIVITY

To determine the variation in productivity of labor, a heavy type of paved track construction, typical for the group of companies studied, was analyzed. The variation of the number of labor hours required from 1913 to 1926 to build 1 mile of single track of this type of construction, was charted on a percentage basis and is given in chart 1. The year 1926 was taken as 100 per cent because in it the productivity of track labor was found to be greater than in any other year in the series. Though based on one type of track construction only, the percentage variations shown on Chart 1 have been assumed to apply to each of the different types considered in determining the total number of labor hours. From these figures the productive capacity of labor, shown on Chart 2, was obtained, the chart also showing the average wage rate.

From these figures the aggregate labor cost of the total track sample is obtained, as shown in Table III. As will be seen in this table wages are approximately 205 per cent higher than they were in 1913, but labor costs only 138 per cent higher.

TABLE II—VALUE OF EACH ITEM OF MATERIAL IN THE TOTAL TRACK STRUCTURE AND THE COMPOSITE INDEX NUMBER OF TRACK MATERIALS

Classification	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926
Rail—high tee and girder	6,423	6,423	6.423	7.823	9,690	12.730	10.886	10.886	10.064					
Rail—low tee	0.014	0.015	0.015	0.015	0.017	0.029	0.022	0.022	0.020	9.917	9.166	9:502	9.502	9.502
Fish plates	0,343	0.343	0.343	0.393	0.440	0.683	0.927	0.022	0.020	0.019	0.019	0.019	0.020	0.020
A le rous	0. 236	0.179	0. 179	0.324	0.430	0.430	0.473	0.502	0.351	0.645 0.308	0.862 0.393	0.889	0.889	0.889
Tie plates	0.950	0.950	0.970	1.089	1.188	1.247	1. 270	1.498	1.138	0.752		0.401		0.352
ocrew spikes and clips.	0.238	0.207	0.177	0.434	0.583	0.583	0.617	0.698	0.518	0.752	1.088	1.039 0.471	1.007 0.488	0.891
Hook head spikes.	0.006	0.006	0.006	0.009	0.013	0.016	0.014	0.019	0.013	0.010	0.012	0.012	0.400	0.700
11es	1,275	1.248	1.188	1.425	1.565	1.565	2. 489	3.378	1.998	2.375	2.824	2.521	2.677	2.762
i orpedo sand	1.030	1.021	1.030	0.880	0.983	1.143	1.171	1.723	2.023	1.513	1.612	1.405	1,405	1.405
Crusned stone	1,751	1.998	1.998	1.618	1.998	2.531	2. 284	4. 187	4.473	4. 282	3.806	3.711	3, 293	3.140
Portland cement	1,911	1.911	1,949	2,503	2.790	3.268	3.631	3.822	2.886	3.698	4.032	4.013	3.918	3.726
Granite paving blocks.	7.099	6,960	6,960	7.308	7,830	7.830	8. 526	9.918	11.310	11.310	11.554	11.658	11.658	11.658
Vitrified brick, paving	0,210	0.210	0.210	0. 262	0. 262	0.308	0.360	0.400	0.384	0.368	0.360	0.348	0.310	0.302
Creosoted wood blocks.	0.183	0.183	0, 183	0.196	0.211	0.273	0.310	0.432	0.303	0.278	0.315	0.303	0.303	0.308
Hauling excavated material	1,208	1.357	1.301	1.561	1.765	2.788	2.788	5.575	4,460	5. 203	5, 203	5. 203	5.761	5.761
Total material	22,877	23.011	22.932	25.840	29.765	35, 424	35.768	43.987	40.755	41.124	41.717	41, 495		41.215
Index Number of material	100.0	100,6	100.2	112.9	130.1	154.8	156.3	192.3	178.1	179.8	182.7	181.4	182.1	180.5
								174.5	170.1	177.0	102.7	101.7	104.1	100.5

El Paso Wins Prize for

Precautions Against Accidents

This medium-sized electric railway has developed many excellent practices which brought for it the Brady award in its class



A safety chalk talk to new pupils of the El Paso High Scho ol. The captain of the police traffic squad did the talking and a representative of the El Paso Electric Company did the chalking

AFETY practices of the El Paso Electric Company, which received the Brady 1927 prize for safety offered to medium-sized electric railway companies, show what an electric railway operating between 1,000,000 and 5,000,000 car-miles a year can do. The company furnishes co-ordinated electric railway and bus transportation service to a combined population of 137,000 in El Paso, Tex., the government cavalry post at Fort Bliss, and Juarez, Mexico. It owns 43.03 miles of equivalent single track and does an annual business of approximately \$850,000. Its rolling stock consists of 76 passenger cars, six work cars and four buses.

In 1926 there were 452 accidents, as compared with 546 in 1925, which is an improvement of approximately 17 per cent. Compared with 1921, the accident figures for 1926 indicated an improvement of 74.4 per cent. In bringing about this reduction, the company has co-operated with the police traffic department, the public schools, civic, engineering and social clubs, the Chamber of Commerce, parents and various other agencies. One of these was the Forum public safety committee, which succeeded in staging a number of safety shows and demonstrations during the year.

Besides all the more commonly known methods, a number of original ideas have been put into force. Outstanding among these are the "honor roll," "safety star system," "bogey breakfasts" and "seven zero days" contest.

One of the earliest organizations in the city with which cordial co-operation in safety measures were established was the police force. The traffic officers and other members of this organization hold regular meetings twice monthly. Frequently, now, the operating officials of the El Paso Electric Company are invited to meet with them and discuss traffic problems and accident prevention. In the arrangement of car stops and parking zones for automobiles the advice of the company is always sought by the department, and often it is possible to make valuable suggestions. The company supplies the department with accident data.

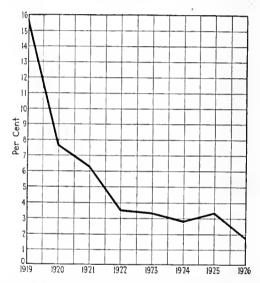
Co-operation with the daily papers is intimate. The El Paso *Herald*, for instance, during 1926 published short biographies of each of the company's gold star safety men with a portrait. One of these sketches appeared every day during the year until the list of gold star men was exhausted. The company supplies the daily papers in El Paso with any information about operation which it is thought will be of interest to the public. Thus a great deal of safety news appears in type.

The company has also co-operated with various civic clubs, has furnished them many motion picture films dealing with electrical subjects, and on a number of occasions representatives of the company have been invited to address the meetings of these clubs.

Close co-operation has been effected with the public schools. Films have been loaned to them, safety calendars have been supplied and during the year students in all high schools in Texas were called upon to submit safety art posters in a state-wide contest. Upon request, the company furnished to one of the art teachers, for

help in this contest, a set of safety slogans which had been run on the dashboards of the street cars.

As already explained, the public safety committee of the Forum planned and executed many novel safety demonstrations during the year. The manager of the company was chairman of this committee, and a number of company employees were active in the work. A week was set aside, known as "Anti-Speeding Week." committee concentrated its efforts on the discouragement of careless and reckless speeding of automobiles through the crowded city streets. A street car, equipped with numerous safety signs and slogans, which characterized speeding as pure selfishness, was operated about the city. During another week, as part of the program of the same committee, a huge safety demonstration was staged in one of the largest municipal parks. The demonstration dealt with various phases of public accidents, such as street car accidents and those likely to occur to persons playing around live wires. On this occasion the



The percentage of gross earnings spent for accidents and claims has shown a rapid descent in the last seven years

prone pressure method of resuscitation and other methods of first-aid treatment were demonstrated by the employees of the company.

Another activity of the Forum committee during the year was the staging at Liberty Hall of a giant safety spectacle. It was in five episodes, dealing with different accident hazards to pedestrians and those confronting school children during vacation periods. The episode dealing with street car hazards was; handled by company employees by means of a safety court scene, in which the police traffic squad co-operated. Offenders charged with violation of the safety code, most commonly the cause of accidents in which street cars become involved, were properly dealt with by a stern but just judge. This skit, which was written by employees of the company, was cleverly presented and made a deep impression upon the large crowd that witnessed the performance.

A monthly safety parade, in which many local merchants and industrial concerns entered novel and striking floats, was another important activity of the public safety committee during the year. The company entry was called "The Book of Safety." This giant book contained pages measuring 4x6 ft., so arranged that the leaves could be turned. Left-hand pages contained safety messages, such as "Believe Me, It Hurts to Get Hurt." The pages opposite each message were left blank, but

during the progress of the parade a company investigator, who is also an excellent cartoonist, drew pictures illustrating these messages. They made a big hit. A picture of the company's float, with a story about the big parade, appeared in the *National Safety Magazine.

DEPARTMENT OF INVESTIGATION DOES MORE THAN SETTLE CLAIMS

The company's claim department is known as the department of investigation. It has been made a part of the transportation department, and the relation between it and other divisions of the transportation department is one of the most splendid co-operation.

When a man enters the employ of the company, the superintendent of the department of investigation has a friendly talk with him, in which he outlines the company's interest in accident prevention and assures the new employee of every assistance in his work. If at any time an operator displays signs of carelessness, his case is given particular attention by the department. Frank and confidential chats are had with him and the cause is usually determined and eliminated.

The superintendent of the department takes frequent trips over the system during which he talks to operators regarding various phases of the accident situation and encourages them to greater effort and vigilance in the

practice of safety.

Whenever children are found playing near the car tracks, stealing rides or in any way molesting the company's service or equipment, their names are obtained and a letter is sent to their parents. Frequently, personal calls are made upon the parents, who are warned of the danger of such practices and are told that the chief interest of the company is to protect the youngster from possible harm and to promote greater safety.

CHANGES FOR SAFETY IN EQUIPMENT

The company has done much in the way of changing its track and car equipment in the interest of safety. In one instance it moved its track from the side of the street to the center, to allow the street to be widened and reduce the accident hazard. It has equipped all cars with automatic safety doors, marked with the word "Stop," so that it can be seen when the door is opened, to warn approaching vehicles. It has put "Watch Your Step" signs on all cars, has equipped every important street intersection and all dangerous crossings on the system with signs reading "Slow Down-Car Line" and has placed warning signs on both ends of all double truck equipment, reading "Please Do Not Try to Pass This Car on Curve." It has provided an oak wood wheel block for the use of each car on a line that terminates on a rather steep grade near the High School to be used while the operator is changing ends. Other changes have been made in the equipment where they have seemed reasonable to promote safety.

In operation, cars on all the lines are required to stay at least a block apart in all parts of the city, except in the downtown section or on sidings and at important junction points. This has eliminated car bumps.

Signs on Buses Too

An equal amount of thought has been given to the safety equipment of buses. Large attractive stop lights have been installed on the rear of all buses with the word "Stop" on the lens in white letters on a red field. A sign that reads "Toot Your Horn and This Bus Will Gladly Move Over" has been painted across the rear end

of all buses, both in interurban and city service. All buses have been equipped with awnings, which shade the rear seats, making riding more comfortable. They are installed at an angle so as not to interfere in any way with the operator's vision or proper use of his rear view mirror.

Rearrangement and enlargement of the shops and carhouse during the year enabled a number of added safety precautions as well as fire precautions to be made. Warning signs in English and Spanish have been placed on all high-voltage machinery. The electric welding machines have guards and signs, cautioning workmen and others not to look directly at the arc. All shop machinery and equipment is inspected regularly, and every possible precaution taken to provide safe working conditions.

TROLLEY BREAKS REDUCED

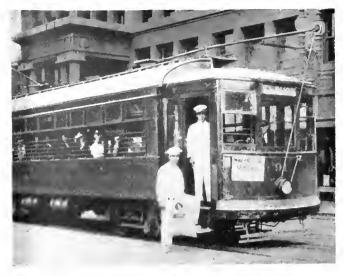
In El Paso, the hot days in summer, followed by cool nights, make maintenance of trolley wires a serious problem on account of the extreme expansion and contraction. This situation has been met by frequent and thorough inspections. The system has been divided into twelve sections, one of which is worked over during each 30-day period. In this way the entire system is gone over every year. This enables the company to keep all overhead trolley wire in excellent condition at all times. Phonoelectric wire is installed on all heavy-duty curves.

By the various means described, trolley breaks have been reduced from 239 during 1921 to 21 during 1926.

BETTER MAINTENANCE OF EQUIPMENT

The efforts of the company, especially in recent years, toward greater efficiency in maintenance and inspection were not prompted entirely by a desire for greater safety, yet they are found to have an important influence on it. All cars are subjected to a thorough inspection every night. These inspections cover brakes, controllers, trolleys and all wearing parts. In addition to this daily inspection, cars have a general inspection after running from 1,500 to 2,000 miles, depending on the type of equipment. This schedule means that each car has a general inspection every ten or twelve days. Motors are overhauled after each 50,000 miles run.

An ingenious improvement has been made in the engineer's valve, which is the old Type M-28. A small hole $\frac{7}{32}$ in. in diameter was the only brake service position of this valve. It was easy for the operator to push the brake handle past this hole into a lap position, through which no air passed. When this was done rapidly, it



Employees in white uniform sweep out the cars at convenient junction points

frequently happened that the valve handle passed the brake service position to the door open position, creating an accident hazard.

The master mechanic of the company perfected an improvement in the valve, which eliminated this difficulty. A second hole of $\frac{5}{32}$ in. diameter, was drilled $\frac{3}{8}$ in. from the original brake service position, and the two were connected by a slot. This changed the old lap, or "handle off," position and made it possible to obtain air all the way between the two positions. The value of this improvement was so obvious that the manufacturers adopted it as standard. The advantage from a safety standpoint is that it eliminates the danger of safety doors being opened before cars come to a full stop, thus avoiding accidents from this cause.

A rule has been passed limiting the speed of cars on all switches and around curves to 4 m.p.h., and it has been found possible to arrange the schedules so that this rule can be followed without any sacrifice of schedule speed between termini. The result has been to prevent many derailments and split switches.

Honor and Bonus System

To maintain the interest of the operators in safety, they are kept fully advised regarding the accident situation at all times. The method used to do this, besides being simple in conception and execution, has proved to be most effective.



Keen competition for the best safety record is maintained among the different divisions.

The progress of each during the month is recorded on a miniature racetrack

A record is posted on the bulletin board daily, giving a list of all street car and bus accidents that occurred on the previous day. A chart is posted to show the number of accident and no-accident days by months over a six-year period.

Each operator has assigned to him a special card for recording chargeable accidents, with blank spaces for listing the various kinds of accidents. They hang in a case inclosed in glass, a separate hook being provided for each card. After an accident is recorded on such a card it is transferred to a similar case marked "accidents this month." Then, if it is found to be a chargeable accident, it is placed in a third case similar in design to the two others, but marked "charged accidents this month." All chargeable accidents are marked on the card in such a way as to distinguish them from other occurrences, and these cards supply at a glance a record and history of the accidents of every trainman.

Each month an honor roll is compiled and posted, containing the names of all those who have worked during the previous month without having been charged with an accident. After a trainman has been on the honor roll for three consecutive months he has a day off with full pay. For each consecutive month thereafter that he remains on the honor roll he has an additional day off with pay. Whenever he is charged with an accident he has to start all over again.

In addition to being placed on the honor roll, a trainman who has completed twelve consecutive months of operation without an accident is given a gold star. Individual stars are given for each year up to and including three. Operators wear these stars upon the sleeves of their uniform coats. Operators who complete four years without an accident receive a large star with a numeral in the center to indicate the number of years they operated without an accident. This system, known as the honor roll system, has been in effect for seven years and at present 70 per cent of all the trainmen of the company are gold star operators.

Several "no accident" day contests have also been conducted. In the last one six consecutive days was the record. The trainmen have taken a great interest in these contests.

To provide a realistic representation of the progress of the contest, a miniature racetrack has been arranged, with a wooden horse and rider to represent each division. Each day that a division has no accidents the corresponding horse is moved forward five notches. With one accident the horse is moved only four notches; if there are two accidents, only three notches, and so on. At the end of each month the winning division receives a banner, which is held until the race is won by another division. Operators and inspectors of the division winning the banner for two consecutive months are invited to a safety banquet. These banquets receive wide publicity from the local newspapers and help to awaken and keep alive a public safety conscience.

Bogey Breakfasts for the Men

Bogey, or 2 a.m., breakfasts for all trainmen constitute another method of rewarding operators for unusual accomplishments in accident prevention. The best previous month's accident record is set as a bogey. During the four years that this system of reward for safety and operation has been in effect there has been a reduction in the number of street car accidents of approximately $66\frac{2}{3}$ per cent.

At the bogey breakfast held on Aug. 16, 1926, about

225 were present, including trainmen and their invited guests. The hour was selected because it was the only one in the 24 when all the men could get together, A great deal of interest and enthusiasm was displayed.

Although these measures to promote safety have been taken in behalf of the general public, equal precautions have been taken to provide proper measures of sanitation and health for the employees and the public. The grounds about the properties belonging to the company have been made attractive by the planting of grass, shrubbery and flowers. The storage yard has the appearance of a pleasant and inviting park, as it has a neat iron fence around it, there is a flagpole in the center, the ties and car wheels are stacked in neat and orderly piles, the litter is removed and all tools and equipment are carefully looked after.

The cars are kept clean on the road by a special "white wing" service stationed at convenient junction points. The members of this staff are dressed in white uniforms and are equipped with brooms, dustpans, dusters and other paraphernalia to keep cars and buses neat and tidy at all times. Their appearance at work is evidence to the public that this important matter receives consideration. All cars and buses are disinfected every night by a solution applied to the seats, woodwork, flooring and hand straps.

Safety kits have been installed in the carhouse, transportation club room, bus garage and power plant. They are regularly inspected and carefully equipped for the protection of employees. All employees receive regular instruction in first-aid work and the prone pressure method of resuscitation, and all of them know what to do in an emergency.

Meeting Motor Truck Competition

By Ray B. Needham Traffic Manager Bamberger Electric Railroad, Salt Lake City, Utah

Like many other interurbans, at one time the Bamberger Electric Railroad, Salt Lake City, Utah, depended almost entirely on its passenger business for revenue and handled very little freight. The increasing passenger traffic was due to frequent service as compared to the long-interval steam railroad service, generally adjusted to fit in with transcontinental schedules. Later, through more frequent freight service the Bamberger line built up a large l.c.l. freight tonnage. Both this business and carload traffic were confined largely to local freight on its own line. Still later through freight rates were established with connecting steam lines, with the result that an attractive interline carload business was developed.

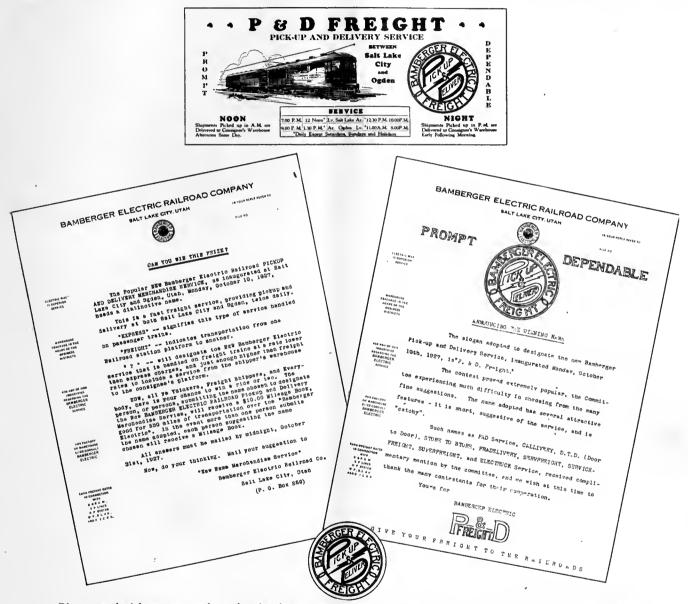
Upon the completion of the concrete highway paralleling the Bamberger Electric Railroad between Salt Lake City and Ogden the auto freight trucks started to compete in the handling of the l.c.l. tonnage, and not only transported the shipments between the two cities at slightly greater rates than the railroad's, but included free drayage at point of origin as well as at destination. As a result the Bamberger Electric saw its l.c.l. tonnage gradually decrease, and it was apparent that the only hope of regaining this business was to put on a pick-up-and-delivery trucking service at terminals so as to compete with the trucks.

Two l.c.l. freight trains, at noon and at night, are operated in each direction daily except Saturdays, Sundays and holidays. Upon telephone notification auto trucks call at warehouses and stores in the retail and wholesale districts and shipments picked up in the morning are delivered to the consignee the same day and shipments picked up in the afternoon are delivered to the consignee early the following morning.

This new service is offered to the public at rates

telling them of the contemplated service and asking them to submit a name or slogan to designate it. A prize of a mileage book good for 500 miles of travel on the Bamberger Electric was offered to the person or persons suggesting the name chosen.

The contest proved extremely popular, the committee experiencing much difficulty in choosing from the many fine suggestions. The name adopted was "P. & D. Freight," this being symbolic of the real service. The



Blotters and stickers were used to advertise the new service, and letters sent out announcing the result of the contest which chose a name for the new service

slightly higher than for the regular freight service. As a comparison the rates for the four classes are:

	Standard Freight Rate,	P.& D. Rate
Class	Cents	Cents
1	42½	50
	35½	40
	28½	30
4	22½	25
Contest	FOR NAMING THE SERVICE	

After business has been lost it sometimes is difficult to regain, so it was decided the best way to bring this new service before the public was through an advertising New Name Contest. Hundreds of circular letters were mailed to the various shippers and receivers of freight

advertising obtained from this contest could not have been derived in any other way.

While both pick-up-and-delivery service are provided the delivery feature is the most important. Most shippers have consignments to more than one railroad station, and since they operate their own trucks, they prefer to regulate their own delivery to the various railroads, carrying their l.c.l. freight to the railroad platforms. The result is that frequently the railroad under this new service performs only the delivery and not the pick-up.

The company feels that the new departure is a financial success. Although the net profits at the present time are not large the management expects a larger figure with the increase in freight volume.



Electric express train on the Gothard line at Erstfeld, north of the principal tunnel. The mountain in the background is the Bristenstock

Electrical Equipment of Railways in Switzerland

Returns Large Profit

WITZERLAND is an ideal Scountry for electrical development. It has water power aplenty. Coal is expensive and the many grades on its railway lines make the use of electric power by them particularly desirable because the power which can be applied to a train is practically unlimited. Finally, absence of smoke makes electric operation much more agreeable to passengers, particularly through the many long tunnels which are traversed by the Swiss railway lines.

It is not surprising, therefore, that the Swiss government has been very active in electrical equipment of its railways. During the war, although Switzerland was not one of the belligerents, there was a temporary stoppage in construction because of the delay and difficulty of securing material, especially copper. By the end of 1919, 67 miles of route had been equipped. This has been rapidly increased during recent years. By the end of 1921 there were 136 miles; by the end of 1923, 317 miles; by the end of 1925, 531 miles, and by the end of 1926, 660 miles. Some interesting particulars of this equipment and the financial results obtained are given in the last Review published by the Swiss Federal Railways.

A "balance sheet" has been drafted to show the advantages secured by the electrical equipment of the Swiss trunk line railways. It indicates a cash saving during 1926 of nearly \$350,000, besides many indirect gains. By the end of 1928 it is expected that 60 per cent of the track of the Swiss Government Railway System will be electrically equipped. On this 60 per cent of the track, 80 per cent of the business of the

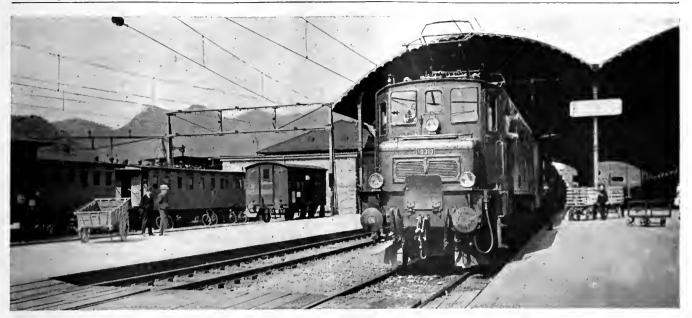
railways is done

From it the information following has been compiled:

It was expected that by the end of 1927 the length of route equipped would be 930 miles and by the end of 1928 there would be 1,040 miles of route, with more than 2,275 miles of track equipped with electric This mileage corresponds to about 60 per cent of the system and will comprise lines which carry about 80 per cent of the total traffic. These mileage figures are, of course, exclusive of the

electrically operated interurban lines under private ownership in Switzerland. With these included, the figures at the close of 1928 are expected to be approximately 2,060 miles of route and 3,280 miles of track.

Power to operate the government railway system is developed for the most part from high-head water-power, acting against impulse turbines. Some of the water has to be passed through mountains, and altogether about 15 miles of tunnels for this purpose have been constructed. The flumes comprise about 6 miles of steel conduit, having a weight exceeding 9,000 tons, while the installed capacity of the impulse turbines themselves reaches about 300,000 hp. In the oil transformers at the



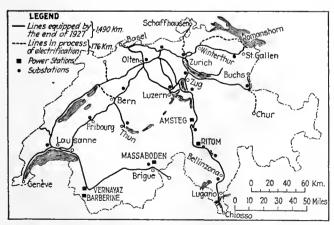
Electric train at Olten, a junction point on the direct line between Basel and Luzern

trolley wire represents 3,800 tons of copper, which is suspended from 4,000 tons of catenary cables. The latter are hung on 200,000 insulators, weighing about 11 lb.

Despite the tremendous investment which this electrical equipment represents, official reports of the Federal Railway Department show that the financial results secured have been satisfactory. Statistics have been compiled to give what would have been the expense of operating the system by steam as formerly, as compared with electricity. The figures for 1927 indicate that with electric power the cost during 1927 has been at least 1,750,000 Swiss francs (\$350,000) cheaper than if steam had been retained. The Director-General of the Department has tabulated the data in the form of what might be called a balance sheet, with debits on one side and credits on the other. It is reproduced herewith to show the saving for the year 1927 of 1,750,000 fr., mentioned above. In this table and elsewhere in this article the francs quoted are Swiss francs, which are worth about 19.3 cents each, or approximately five to the American dollar.

ON THE DEBIT SIDE

On the debit side of this balance sheet the first and most important item is the interest on capital. The investment is estimated at 525,000,000,000 fr.



Map showing conditions of government railway electrification in Switzerland at the end of 1927

substations there is more than 1,200,000 lb. of oil. The amount, however, 35,000,000 fr. can be deducted because it was received from the government as a subsidy for speeding up the work, so that the charge actually to the department does not exceed 490,000,000 fr. The interest on this sum at $5\frac{1}{2}$ per cent amounts to 26,950,000 fr., or the first item on the debit side.

The second item is the sum of 7,936,000 fr. for depreciation and renewals on the electrical equipment during the year. The third item of 750,000 fr. is for personnel of operation, current maintenance, and energy purchased other than that which would have been required with steam operation. Hence, the total of 38,636,000 fr. is reached as the charges on the debit side of electric railway operation.

ANALYSIS OF CREDIT SIDE OF SHEET

On the credit side of the sheet the first item is saving in fuel, which is figured for 1927 at 450,000 tons. This coal would have had a value at the frontier, as all coal has to be imported, of 17,100,000 fr. The next item is that of economy in personnel, which is figured at 13,095,000 fr. for 1927. This figure is based on the fact that in 1926 there were 8,616 employees in train service and in the stations, with an eight-hour day, yet the business done was considerably greater than in 1913, when there were 8,886 employees on the payroll with a workday of from 10 to $10\frac{1}{2}$ hours.

It is expected that as electrification is extended further reductions in this item can be made. The saving in manpower comes in various ways. One is that longer trains are hauled. Another is that they come to speed more quickly and make better time, especially on the heavy grades, so that the train crews make longer trips per day than formerly. Then, there has been a great reduction in the force required to make the locomotives ready for their runs and in switching them in the yards.

The third item is saving in locomotive maintenance. Thus, the figures for 1926 show that the maintenance of the electric locomotive averages 30.24 centimes per locomotive-kilometer (9.68 cents per locomotive-mile). although steam locomotive maintenance costs 35.40 centimes per locomotive-kilometer (11.33 cents per locomotive-mile). This is in spite of the fact that the electric locomotive in 1926 hauled an average train load of 293 tons metric, whereas the average for the steam loco-

COMPARISON OF ANNUAL EXPENSES AND SAVINGS CAUSED BY RAILWAY ELECTRIFICATION IN SWITZERLAND

DEBIT		CREDIT	
(Charges due to electrical equipment) 1. Interest at 51% on the investment required by the electrical equipment	Francs 26,950,000 7,936,000 3,750,000 1,715,000	(Economies secured by electrical equipment) 1. Saving in purchase of coal. 2. Saving in labor on trains and in stations and yards. 3. Saving in maintenance of machinery. 4. Saving because the use of electric locomotives has made unnecessary the purchase of additional steam locomotives. 5. Other miscellaneous savings (maintenance of track, water, lubrication, haulage and switching of coal cars).	Francs 17,100,000 13,095,000 4,566,000 4,389,000 1,201,000
Total	40,351,000	Total	40,351,000

motive was only 210 metric tons. Hence the economy for locomotive maintenance has been put at 4,566,000 fr. in 1927.

Estimates on the saving in other items of equipment, such as track, lubrication, etc., including rent of foreign coal cars, is more complicated. Some of these savings are indirect, as increased output of track gangs in tun-

nels (of which there are a great number on the Swiss Federal Railways) because the working conditions in the tunnels are very much more favorable than under steam traction. However, a careful consideration of all of these items has brought the conclusion that the saving can be put as 1,201,000 fr.

Last, but not least, is the fact that if the government had not had under way a gradual program of railway electrification it would have been obliged within recent years to purchase a large number of steam locomotives annually. Before the war the number so needed averaged about 30 annually, and there is no doubt that without electrification it would have been necessary during the past ten years to have added at least 200 new locomotives to the system at a cost of at least 50,000,000 fr.

This sum would correspond annually, for interest and amortization to 4,389,000 fr.

The figures on the credit side, therefore, amount to 40,351,000 fr., as against 38,636,000 fr. on the debit side, leaving a balance as a saving from electrification of 1,715,000 fr.

In other words, electrical operation shows an actual cash reduction in expenses, besides possessing many other advantages, such as providing much more comfortable transportation and increasing the capacity of tracks as will be discussed later.

It should also be borne in mind that a considerable part of the electrification was carried on during 1918 to 1923, years which unhappily coincided with an era of high prices, so that the cost of the equipment as given on the debit side of the balance sheet actually was from 75,000,000 fr. to 100,000,000 fr. more than if it had been installed at present-day prices. If these had prevailed there would have been a reduction in the annual charges of from 4,100,000 fr. to 5,500,000 fr.

Besides the direct advantages obtained there are many indirect gains, which are impossible of evaluation.

One of these is the improved hygienic conditions and comfort, not alone of the passengers but of the railway employees, and even of the people living close to the right-of-way, from the substitution of electric for steam power.

Another very important advantage, briefly mentioned above, is the increase in the capacity of the tracks.



Electric express train on the Gothard line, near Wassen. This is one of the most interesting sections of the entire line

The extent of this is shown on a typical line, the Gothard, on which in February last, in a single day (Feb. 22, 1927) it was found possible to haul in one direction (north to south) 22,822 tons of freight, although before electrification the maximum freight hauled over this line in any day of 24 hours was 11,453 tons. This was on March 5, 1915.

An interesting point brought out in the conclusion of the article is that of the immense sum of 680,000,000 fr. which will have been invested in the electrical equipment of the railways up to the end of 1928 not more than one-fifth has had to be spent outside the country. In other words, in round figures, 540,000,000 fr. is the amount which by Dec. 31, 1928, will have gone to Swiss manufacturers for equipment and to the labor of piercing the tunnels, building the power stations and carrying on the other work required. At the same time the annual expenditure outside the country of some 20,000,000 fr. for coal for the operation of the railway system has been made unnecessary. In other words, this money was spent within the country, providing employment for its citizens and contributing to its prosperity.

Association Activities

Modernization Programs Hold Delegates at C.E.R.A. Winter Meeting

Interest at Cincinnati meeting keen in proposed improvements in both city and interurban railway facilities in territory. Executives impressed with favorable situation in Cincinnati

"IT IS high time to stop crying over in Cincinnati, Walter A. Draper, president Cincinnati Street Railway, sketched instead, to improvement of electric railway facilities, so as to attract that portion of the available passenger business which we are in a position to handle." these terms Martin Ackerman, retiring president of the Central Electric Railway Association, sounded the keynote of the opening session of the winter meeting held in Cincinnati on Thursday and Friday of last week. Mr. Ackerman pointed approvingly to the Cincinnati Street Railway as among those that have adopted the modernization idea. "Here in Cincinnati there is under way a major rehabilitation program which, while not yet sufficiently advanced to show its full possibilities, has for its object the complete modernization of the property from the ground up," said Mr. Ackerman.

Continuing, he stressed the thought that despite evidences of progress on individual properties there are so many more opportunities for improvement still uncapitalized that the industry cannot afford to rest on its oars for a moment. Mr. Ackerman pointed out that there has been little real progress in the development of passenger business on interurban lines of the territory with what he characterized as an extreme lack of co-operation in the arrangement of local and joint time-tables between electric lines.

The old alibi of the automobile is all too often offered as an excuse for inertia and inaction, according to the speaker, who enlarged on the theme that to build electric railway revenues the system concerned must provide service first and then go after the patronage. Speaking especially of the interurbans, he urged a campaign for clean stations, for advertising the stations with electric signs, for the use of lighter, faster cars with quick acceleration, and for the possible use of sleeping, parlor and dining cars on roads which have long through service con-

Concerning freight business as the possible salvation of many interurban lines Mr. Ackerman explained that while some lines are in a position to do practically an express business, at the present time this service is being sold at freight rates. Concluding, he urged that railway men ride on their own cars in order that first-hand information may be secured regarding the service rendered.

Talking on the street railway situation

dent Cincinnati Street Railway, sketched briefly some of the difficulties which complicated the reorganization of the local company and delayed the inauguration of its progress of rehabilitation which is now well under way. In conclusion he said that in his opinion it didn't matter so much what particular type of franchise a street railway operated under just so the company and the city concerned possessed the determination to work out their problems together in a spirit of mutual understanding.

ACCOMPLISHMENTS IN FREIGHT TRAFFIC

Tracing the evolution of freight traffic conditions and demands through the past 25 years Frank D. Norveil, general pas-

COMING MEETINGS

Electric Railway and Allied Associations

Feb. 13-17-American Institute of Electrical Engineers, winter convention, Engineering Societies Building, 33 West 39th Street, New York,

Feb. 17-18-Central Electric Railway Accountants' Association, Hotel Gibson, Cincinnati, Ohio.

March 23-Maryland Utilities Association, annual meeting, Emerson Hotel, Baltimore, Md.

May 2-5-Southwestern Public Service Association, Dallas, Texas.

May 6-12-Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome,

June 6-8-Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

July 8-12-Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27-Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

senger and freight agent of the Union Traction Company, Anderson, Ind., reviewed the accomplishments of that period. He explained how the interurban systems of the central territory in becoming parties to the new tariff, effective Jan. 15, providing through rates to points south of the Ohio River, will find opened a much larger field of service. Speaking of competition from trucks, due in a measure to their giving store-door delivery in many instances, Mr. Norveil suggested meeting it with a "pick-up" and delivery service on the part of the interurban. Pointing cut that carload freight traffic represents the cream of all railroad revenues, he urged that electric roads put themselves in shape to accept and handle standard steam railroad equipment; that only by so doing could they expect to build up satisfactory revenues from freight business.

Mayor Murray Seasongood in welcoming the railway men to Cincinnati commended the attitude of the local company's executives and said that the success of the franchise in effect in Cincinnati rested equally with city and company

as a joint obligation.

Lucius S. Storrs, managing director American Electric Railway Association, when called upon by President Ackerman for a word, outlined briefly the status of legislation pending in Congress which should concern the electric railway industry and pointed out how essential to the work of the national association was the interest and cooperation of all the railway properties.

One of the high lights of the convention was the short speech made by R. P. Stevens of New York, president of the A.E.R.A., at the banquet on Thursday evening. President Stevens took occasion to explain that the return of the national convention for a third time to Cleveland, Ohio, was decided upon when it was found the facilities for exhibits at Atlantic City could not be completed in time for the railway convention. He prophesied the largest exhibit in the history of the railway industry was in prospect for next fall's gathering.

Judge Baggott of Dayton, Ohio, was the banquet speaker and delivered a humorous address in which legislation, present-day morals, and kindred subjects of current interest were deftly treated.

NINETEEN COMMITTEES MAKE REPORTS

A symposium of the activities of the Central Electric Railway Association was contained in the reports of some nineteen committees. Calling attention to the work already done by the Master Mechanics Association as meriting greater support on the part of the parent organization, George R. Green, retiring president of that group, urged a closer co-operation of member companies in sending representatives to the meetings. The publicity committee's report recommending the employment of an individual to carry the message of the railway industry to civic associations throughout the Central territory was approved. Recommendations of the safety committee included affiliation with the National Safety Council, the organization on each railway property of a definite program of safety work, and the support of legislation for requiring licenses for automobile drivers. The finance committee's report recommending the increase in member dues from \$1 to \$1.50 per track-mile to take care of necessary increases in the personnel of the association's Indianapolis office was approved, and the corresponding changes in by-laws suggested in the report of the constitution and by-laws committee.

CINCINNATI FRANCHISE EXPLAINED

Friday's session of the convention was opened with a paper by E. D. Gilman, Director of Public Utilities of the city of Cincinnati, in which details of the franchise provisions under which the Cincinnati Street Railway operates were explained.

"A franchise such as ours demands the closest co-operation on the part of the officials of both the city and the company," Mr. Gilman explained. "With such co-operation and with a careful study of the physical and financial effects which must be harmonized, the citizens of Cincinnati are going to see within the first four years of the franchise a com-

service.

Pointing out the difference between practical and impractical programs of advertising E. T. Gundlach, president Gundlach Advertising Company, Chicago, indicated possible tests which might be applied in endeavoring to ascertain the results actually achieved from specific advertising campaigns.

MR. RODGER ELECTED PRESIDENT

A business session concluded the work of the convention at which officers for the next year were elected as follows: President, W. S. Rodger, general traffic manager Detroit United Lines, Detroit, Mich.; first vice-president, L. M. Brown, vice-president Interstate Public Service Company, Indianapolis, Ind.; second vice-president, L. G. Tighe, Northern Ohio Power & Light Company, Akron, Ohio. L. E. Earlywine, Indianapolis, Ind., was re-elected secretary-treasurer.

Three new members of the executive committee were elected: T. A. Ferneding, general manager Springfield-Xenia Railway, Dayton, Ohio; J. A. Greenland, general freight and passenger agent Indiana Service Corporation,
Fort Wayne, Ind., and F. J. Foote, master mechanic Indianapolis, Columbus & Eastern Traction Company, Springfield, Ohio, and newly-elected president of the Central Electric Railway Master Mechanics Association.

The summer meeting will be held at Cedar Point, Ohio, the latter part of Tune.

Central Master Mechanics Discuss Modern Service Requirements

Papers dealing with recent developments in electrical railway equipment occupy attention during Cincinnati meeting held on day before Central Electric Railway Association Sessions

PAPERS and discussion dealing with equipment developments designed to meet present-day operating require-ments, and street traffic conditions, occupied the attention of the Central Electric Railway Master Mechanic's Association at a meeting held in Cincinnati, Ohio, on Jan. 25. This one-day meeting, immediately preceding the midwinter meeting of the Central Electric Railway Association, included in addition to the presentation and discussion of papers dealing with improved electric railway equipment, a trip of inspection to the new shops of the Cincinnati Street Railway, manufacturing plants in the city, and the plant of the Cincinnati Car Company. During a luncheon meeting at noon, members of the association were guests of the Tool Steel Gear and Pinion Company.

Variable load brakes, double-reduction W-N truck drive using high-speed, spring-mounted motors, and the use of roller bearings on railway cars, were the subjects of papers by J. S. Y. Fralich, Westinghouse Traction Brake

Company; W. J. Clardy, Westinghouse Electric & Manufacturing Company, and M. S. Downes, Timken Roller Bearing Company, respectively. During the luncheon meeting, E. H. Arnott of the Central Service Bureau discussed the initial results of the parking prohibition measure in the Chicago Loop district. President George R. Green, general superintendent Chicago, South Bend & Northern Indiana Railway presided,

Braking Problems with Light Cars

"Introduction by electric railways of light weight relatively large capacity cars has brought braking problems not heretofore encountered," said Mr. Fralich. This he attributed to the fact that single truck cars frequently have a light weight that is only half of the total loaded weight, while many double truck cars weighing approximately 30,000 lb. empty, weigh from 45,000 lb. to 50,000 lb. when loaded with passengers. The wide variation between empty and loaded weight makes it impossible to

plete change in their transportation variable conditions of loading with the ordinary type of straight air brake equipment.

The speaker cited average brake design standards on electric railway straight-air brake installations to show that under reservoir pressures varying from 50 to 65 lb. per square inch, braking ratios on empty modern light-weight cars vary from 85 per cent to 100 per cent with minimum reservoir pressure, and from 110 per cent to 130 per cent with maximum reservoir pressure. Even with these braking ratios, which the speaker considered higher than necessary for empty car conditions, in some cases stopping distances are excessive when such a car is fully loaded. This was illustrated by a typical example of the conditions which would be found on a light weight car assumed 30,000 lb. empty and having a maximum passenger capacity of 125. Such a car when empty would have a braking ratio of 100 per cent at 50 lb. cylinder pressure, increasing in proportion as the cylinder pressure increased to a maximum of 65 lb. At 65 lb. cylinder pressure the oraking ratio for the empty car would be 130 per cent. On the other hand, this car when fully loaded, assuming passengers at 140 lb. each, would have only 63 per cent braking ratio when the cylinder pressure is at its minimum of 50 lb. Thus, it was pointed out, such a car develops a combination of conditions under minimum and maximum cylinder pressures and under empty and fully loaded operation, in which braking ratios and consequently stopping distance vary by as much as two to one.

VARIABLE LOAD BRAKE GIVES AUTOMATIC ADJUSTMENT

It was because of this unsatisfactory braking condition that the Westinghouse company developed its variable load brake, according to Mr. Fralich. This device, he explained, constitutes, primarily, an automatically adjusted feed valve that is set for the brake pressure desired to meet the changing weight conditions brought about by variations from empty to full car passenger loads. Lantern slides were shown to illustrate how the adjustments of this regulating device are controlled by the deflection of the springs between the car body and the truck bolster in proportion to the increasing or decreasing passenger loads, the device being automatically locked against all changes in adjustment except when the car doors are open for the interchange of passengers. The speaker called attention to the importance of this refinement in brake equipment, both from the standpoint of safe operation in congested traffic and increased schedule speeds resulting from the possible reduction in stopping time.

Prefacing his description of the W-N type of drive for electric cars, Mr. Clardy declared that changing transportation conditions demand consideration of developments in equipment which will enable electric cars to meet modern operating requirements. surface car of the future," he said, "must provide suitable braking facilities under be an attractive, comfortable vehicle, capable of providing a safe ride at high speeds in a state of quiet enjoyment." Growing traffic congestion and changed transportation standards were held to demand a new type of surface car capable of maintaining high schedule speeds even under dense traffic conditions, and designed to meet present-day standards of safety, speed, comfort, convenience of boarding and alighting, appearance and quietness of operation.

The effect of growing street congestion in slowing down all vehicular speeds has, according to the speaker, directed public attention to the need for relief measures which will naturally result in more definite and scientific regulation of street use. Distribution of rush hour travel over longer periods through the adoption of staggered business and working hours, limitation of heavy trucking operations to the hours after business travel, restriction of parking or its total prohibition in congested districts, regulation of building operations and the storage of building materials to avoid traffic interference, and other proposed measures for the relief of congestion were cited as examples of the trend of public thought toward measures which will open increased opportunity for improved and efficient public trans-portation service, provided the equipment used is made suitable to take full advantage of the improved traffic conditions which may be expected. An article on the W-N drive appeared in the Jan. 28 issue of ELECTRIC RAILWAY Journal, page 152.

Mr. Downs Gives Advantages of Roller Bearings

Mr. Downes, in his paper on railway roller bearings, said that the use of this type of bearing is a question of importance at this time when refinement in engineering and perfection of equipment are dominant thoughts in the minds of progressive railroad men. Furthermore, he explained, the problem of applying anti-friction bearings to all railway service justifies a careful analysis, both from a technical and economic standpoint: first, because it is believed that their use will mean not only a saving of power in regular operation, but also the elimination of hot boxes, and better running conditions generally; second, because they are expected to bring about savings in Inbrication, and maintenance expense as well as reduction in the amount of wear and tear to which the rolling stock is subjected; third, because by their use the riding qualities of the cars may be improved so as to give greater comfort to the riding public.

The problem of producing roller bearings that will stand up under the severe service on railway rolling stock has been a very difficult one, according to Mr. Downes. The solution required extensive tests and experiments which often ended in disappointing failure. These failures have ordinarily resulted from one or more of three causes: first, the crushing strains under heavy loads and blows upon the surface of the metals in rotating members and raceways re-

sulted in fatigue and fractures; second, the diagonal twisting and jamming of rollers; and third, the troublesome end thrust which at times may equal 40 per cent of the vertical load.

Extensive use of self-propelled gasoline coaches within the last few years gave considerable impetus to attempts to produce a practical bearing for railway service, the speaker said. Because of the limited power of the gasoline engine, it was necessary to take advantage of every means possible to improve the load characteristics of the car proper, especially with respect to starting and acceleration. Anti-friction bearings were tried as a possible remedy. Their application produced such satisfactory results in improved starting and acceleration, and in fuel economy and general operation, that bearing engineers were encouraged to continue their efforts to produce bearings suitable for all classes of railway service.

Mr. Downes declared that it has now been demonstrated that it is possible to produce roller bearings of sufficient capacity and durability to stand up under the most severe service. He credited railway mechanical engineers for valuable contributions to the development of a successful bearing by showing what the requirements of the service actually were and pointing out the weak spots in bearing design which were to be avoided.

In order to successfully apply roller bearings to the journals of railroad equipment, certain conditions were held to be essential, i.e., the bearing must have a low frictional resistance for all service conditions; it must have a long service life; the design should be such that both vertical and thrust loads or any combination of these loads may be carried by the bearing proper; quick inspection should be possible; the application should be simple in construction and easy to assemble and disassemble; and finally, the bearing should be adjustable. Lantern slides were shown to illustrate how these requirements are met in the case of the bearing developed by the Timken company.

SMOOTHER OPERATION CAN BE EFFECTED WITH ROLLER BEARINGS

In electric car service the advantages of the use of roller bearings were held to be more rapid acceleration, saving in wear and tear on the motors due to the greatly reduced starting resistance, smoother operation during accelerating and braking periods, greater comfort to the passengers and elimination of journal wear and other forms of journal trouble. Mr. Downes said that the application of tapered roller bearings to the armature shafts of electric motors is receiving wide attention. He added that while this application is still more or less in the experimental stage for motors of city and interurban cars, it has been used extensively in the field of general service motors with a high degree of success. The chief advantages claimed from the use of tapered roller bearings on the armature shaft were freedom from lubrication troubles and the practical elimination of wearthereby reducing maintenance and at the same time preserving a constant air gap in the motor.

Attention was directed to the fact that tapered bearings are used in two types of the light weight electric cars recently developed. Double reduction W-N gear drive trucks are also equipped in the gear box as well as on the journals with tapered roller bearings. The Timken-Detroit experimental car trucks with worm gear drive, use tapered roller bearings on the pinion shaft and on the axles. The extent to which roller bearings will be used on city and interurban cars was held to depend on the economies effected and on the improvement in service that they may make possible.

PRESIDENT GREEN SUMS UP SAVINGS FROM CO-OPERATION

In summing up the work of the Master Mechanic's Association President Green called attention to the importance of savings which are being made for member companies through the co-operative work of mechanical men in the central territory. He emphasized the practical value of the information contained in the papers presented at the meeting, and pointed out the significance of the statements regarding present day transportation equipment requirements in the introduction of Mr. Clardy's paper. In turning over the gavel to F. J. Foote, superintendent of motive power and equipment Indiana, Columbus & Eastern Traction Company, who was elected president for the new year. Mr. Green expressed appreciation of the co-operation given by the several standing committees of the association in making possible the progressive program of work that had been completed during the past year.

Mr. Foote in turn declared that the performance of the association had more than justified the conception of its originators. He emphasized the importance of continuing the established policy of making the business of member companies the primary objective of the association's meetings, and of discouraging entertainment and social activity.

Because of the important part which they play in the work of improving electric railway practices and in the programs of the master mechanics' meetings, a modification was made in the requirements for membership to permit manufacturers' representatives to join the association as associate members at a cost of \$1.50 per year. Applications for membership are to be received by mail at the office of Secretary Earlywine in Indianapolis.

A. W. Redderson, superintendent of equipment Indiana Service Corporation. Fort Wayne, Ind., was elected first vice-president and L. E. Earlywine was re-elected secretary-treasurer. Charles Sigler, T. Nicholl, J. W. Osborne and A. J. Challeen were elected members of the executive committee.

The next meeting was tentatively fixed for some time in May, to be held, at the invitation of the General Electric Company, at Erie, Pa.

Southern Equipment Men Discuss Progress Made in Service Improvements

Latest developments in motor drive, hand brakes, relation of mechanical department to claims and other subjects also receive attention of the meeting

BETTER service and a general improvement in the railway industry in the Southern territory last year, with forecasts of even better results during the coming year, were generally indicated during the three day session of the Electric Railway Association of Equipment Men. Southern Properties, held at the Roosevelt Hotel, New Orleans, La., on Jan. 25-27. The association met with the mechanical division of the Sothwestern Public Service Association.

Cincinnati was selected as the next meeting place, the dates being July 25-27. Robert M. O'Brien, superintendent of rolling stock and shops New Orleans Public Service, Inc., was chosen president; A. Taurman, Birmingham Electric Company, vice-president, and L. O. Eiffert, Alabama Power Company, Bir-

mingham, secretary-treasurer.

That the results obtained by member companies since the formation of the association six years ago, have fully justified its organization, appeared to be the general opinion not only of responsible executives who attended the sessions but of the entire membership. It was pointed out that considerable good has been accomplished by the interchange of ideas of the equipment men. Not only has it resulted in increasing efficiency all along the line but it actually has brought about a reduction of maintenance cost.

A. B. Paterson, vice-president New Orleans Public Service, Inc., stated that the organization of this particular association has proved very valuable in this respect. It began at a time when all properties were in a more or less critical condition, due to the after effects of the war, and it has contributed through earnest efforts, to greatly increased efficiency and reduction in the cost of main-This naturally has brought tenance. about an improvement in the service to the public which is absolutely essential on account of the competition from automobile travel. As a result very little street car mileage has been abandoned in the South. The industry as a whole has been benefited.

The convention itself was one of the most successful ever held, according to officers of the association. The attendance set a new record for the association, more than 200 registrations having been filed. They included delegates from all the Southern properties and associate members and representatives from other properties and plants in other sections of the country. There was little opportunity for entertainment and the delegates devoted most of the three sessions strictly to business.

The first day of the convention was given over to addresses of welcome by Mayor O'Keeie and President H. B.

Flowers of the New Orleans Public Service, Inc., reports of officers and nine prepared papers on subjects of special interest to the industry.

W. H. McAloney of the Georgia Power Company, Atlanta, president of the Association, in his annual report, among other things, said: "We are continually looking toward the betterment and improvement of rolling equipment; looking toward the comfort and convenience of the riding public, for despite the increasing numbers of private automobiles the majority of the people find it most convenient and comfortable to use the street cars, and they are rapidly learning it is very much more economical.

"The experience even in many of the smaller cities has proved beyond a doubt that there has not yet been devised any form of city transportation that equals cars on rails for handling the greatest numbers in the smallest street space with

speed.

"If the tailor makes the man, so it is that the good looking street car holds up the appearance of a city. New Orleans has a right to be proud of her street car system and management. Her record of traveling 200,000 car-miles between car failures is the best in our association and not equalled anywhere on the continent. Besides it is being done

more economically.

The first prepared paper was read by R. S. Bull, superintendent of equipment, Pittsburgh Railways, on "Observations and Outstanding features of the 1927 Cleveland convention." Descriptions were given by Mr. Bull of the "Rail Sedan" of the St. Louis Car Company, a Birney safety car of the same manufacturer, the J. G. Brill "1928 model" car, the Cincinnati Car Company's "Atlanta Car," the car exhibited by the Springfield Street Railway, the Joliet car built by the Cummings Car & Coach Company and others. He also told of the five different types of trucks that were exhibited and of the miscellaneous car equipment representing new de-

George H. Ingles, claim agent Virginia Electric & Power Company, spoke on the "Relation of the Mechanical Department to Claims." He stated that the shopmen can be of real assistance to the claims department by studying the accident reports carefully, inspecting the damaged equipment and reporting immediately. Equipment men also can promote safety, he asserted, by watching for mechanical defects and keeping the equipment in good order. Comfort and good-will of the passengers is a big factor when accidents occur and shopmen are largely responsible for gaining public favor, according to Mr. Ingles.

The latest developments in railway motor drive were treated in a paper by J. K. Stotz, motor engineer department Westinghouse Electric & Manufacturing Company. He discussed fully the truck design, brakes, gear unit and motors of the Brill 1928 model car which is equipped with the W-N double reduction motor drive and Westinghouse 1425 motor. He listed the advantages of the new equipment and gave information concerning operating costs. An article on the double-reduction gear drive with the high-speed spring supported motors appeared in the Jan. 28 issue of the Journal.

In discussing the subject, "Maintenance vs. Repairs," Gus C. Kraus, assistant to superintendent of rolling stock and shops New Orleans Public Service, Inc., outlined the practice of his company in keeping its rolling stock in the best possible condition. Briefly, the practice consists of overhauling car equipment and car bodies on a periodic basis to reduce maintenance costs and equipment failures to a minimum.

"Cost of Maintenance" was the subject of a paper by A. Taurman, superintendent of equipment, way and structures Birmingham Electric Company. He stated that many properties were misinterpreting the standard maintenance account classifications and that difficulty was being experienced in comparing accounts of properties for this reason. Some of the contributing factors for the variation in costs, according to Mr. Taurman, are: Differences in age and type of cars and the condition in which the equipment has been maintained; individual operating conditions on the various properties; extent of supervision and shop facilities; and differing accounting practices.

A detailed description of the car washing machine of the Pittsburgh Railways was given by J. D. Barr, inspection engineer of that company. Mr. Barr related how the machine was developed and explained carefully how to set it up for operation and how to use it. Features of the machine were listed and its applications outlined. The machine was described in the JOURNAL for

March 12, 1927.

Two types of hand brakes, the external or clasp type and the internal expanding type, were described by A. D. McWhorter, general superintendent Memphis Street Railway. He related the operating experiences of several roads which have experimented with hand brakes and gave valuable information and data on their operating characteristics. An abstract of this paper will appear in a later issue of the JOURNAL.

W. G. Walker, railway department General Electric Company, told what the manufacturers are doing to facilitate repairs and to reduce the cost of equipment maintenance. Manufacturers aim to supply operators with replacement parts as speedily as possible and assist the equipment men by supplying drawings, diagrams and information needed in the maintenance and operation of equipment.

A paper on "Co-operation Between

the Instruction Department and the Rolling Stock and Shops Department" was presented by E. J. Murphy, superintendent of instruction and employment New Orleans Public Service, Inc. Good public relationship is often harmed by poor service which can be blamed on improperly trained and incompetent motormen. Realizing this and appreciating the value of public good will the New Orleans Public Service established a training school. The course of instruction of this school and all details of the equipment and methods used were described in Mr. Murphy's paper. An abstract will appear in a future issue.

President McAloney complimented the authors of the various papers for the thorough and complete manner in which the subjects were handled. He said they were so ably handled that there was little room left for criticism or discussion. The delegates put in a long day Wednesday, being in session from 9 o'clock in the morning until nearly 6 in the afternoon, with only one interruption for

luncheon.

METHODS OF PROVIDING SMOOTHER SERVICE

The second day of the convention was given over entirely to the discussion of questions relating to the progress each company has made in 1927 to provide smoother service for the car riding public and the improvements made necessary to do this. The discussions indicated that the improvements in the industry have been general throughout the southern district. The greatest interest was evinced in all the subjects brought up. Mr. McAloney, the retiring president, declared that the results accomplished last year and improvements contemplated for the coming year clearly indicated the value of these meetings and fully justified the organization of the associations.

More than 150 delegates attended the banquet given at the Tip Top Inn on Thursday night. There were no scheduled speeches and only a limited number of men were called upon to give brief talks. Mr. Paterson was chosen toastmaster and was given a vote of thanks for the admirable manner in which he performed his duties in that capacity. He commented on the splendid attendance and spoke of the good work being accomplished at these get-together meetings for an interchange of ideas between the equipment men of the various prop-

erties.

Mr. Flowers after renewing his cordial welcome to the delegates, complimented them on the good work they have done and are still doing. He referred to some of the problems of the street railway companies and pointed out how everything has to be operated on the strict basis of efficiency and economy. He declared that there must be the utmost co-operation between all the departments. In referring to the association of equipment men Mr. Flowers said that the organization has done a great deal toward bringing about this co-operation. He touched upon the acute traffic situation and urged upon

them the need of reliable service in order to offset traffic delays on the system, which have been caused by no fault of

the operating companies.

Following the election and installation of the new officers, retiring president McAloney was given a rising vote of thanks for the very able manner in which he presided over the sessions at Atlanta and New Orleans. Mr. McAloney made a very versatile presiding officer and kept the delegates in good humor at all

Following the adoption of other resolutions of thanks to officers of the New Orleans Public Service, Inc., and others the convention adjourned. Later the delegates made an inspection of the properties of the New Orleans Public Service, Inc.

New Yorkers Study Ways to Speed Up Service

Relief of traffic congestion and faster acceleration and retardation were principal subjects of discussion at mid-winter meeting of New York Electric Railway Association

SPEED was the keynote of the mid-winter meeting of the New York Electric Railway Association held at the Hotel Commodore, New York City, Jan. 31. That "local transportation must keep on the move or die" was the theme of an address at the morning session by Lucius S. Storrs, managing director, American Electric Railway Association. In the absence of Mr. Storrs the address was read by James W. Welsh. An abstract will be published in a future issue. The effect of signal lights on traffic congestion was the subject of animated discussion at the afternoon session. A paper on this subject by Ralph W. Emerson, vice-president and general manager, Cleveland Railway, was presented by L. D. Bale. An abstract will appear in a future issue. High speed traction motors and the importance of proper braking equipment were other subjects discussed.

In the absence of W. G. Gove, president of the association, W. E. Thompson, vice-president, presided at the morning and afternoon sessions. N. W. Storer, consulting railway engineer Westinghouse Electric & Manufacturing Company, presented a paper on the "High Speed Traction Motor," relating the evolution of the present-day motor. He outlined the various problems to be met in designing the high-speed motor and explained why the Westinghouse Company found the use of 300 volts with two motors in series desirable. Mr. Storer listed three advantages of the high-speed motor: The motor weight is carried entirely on the truck frame, removing the motor dead weight from the axle; the motor is so small that a smaller wheel is possible, permitting a lower floor level, and the equipment offers a substantial reduction in weight over the standard single reduction equip-ment. An abstract of the paper will appear in a future issue.

The car builders' views on the highspeed motor were presented by George L. Kippenberger, vice-president and assistant general manager, St. Louis Car Company. He stated that appearance of cars and luxuriousness of appointments have been given much attention but that the important factors of high speed, smoothness of control, quietness of run-

mng and easy carriage should receive consideration also. According to Mr. Kippenberger, the new motors should prove another forward step in modernizing equipment.

The technical discussion of the motors was continued by H. L. Andrews, assistant engineer railway department, General Electric Company. He pointed out the advantages of 600-volt operation over 300-volt with two meters in series, and gave figures to show that there was no saving in weight with the new-type trucks. The paper in abstract form will appear in a later issue of the

W. H. Sawyer, past president, American Electric Railway Association, commenting on Mr. Storrs' paper, said that any railway man who feels that nothing can be done to improve conditions on his property should get out of the business to make room for a more wide-awake man. The wheels of the electric railway industry will not keep on turning forever of their own accord. We must all get behind and push. Sawyer also emphasized the necessity for the industry supporting the progressive manufacturers in the development of new equipment.

R. F. Carbutt told how the electric railway in a small town can be made

prosperous and successful.

The traffic problem in New York City was the subject of a talk by Hon. Philip D. Hoyt, deputy police commissioner. He pointed out that the primary duty of the police is protection, and that facilitating traffic movement is secondary. K. W. Mackall, engineer, Crouse-Hinds Company, talked on the subject of traffic control, asserting that proper co-ordination of street car and vehicular movement can be attained with correct signals. He also pointed out the advantages of short cycles. Harvey N. Smith, bureau of gas and electricity, Syracuse, N. Y., emphasized the im-portance of considering the needs of the street railway in designing and installing traffic lights.

"Brakes as they affect schedule speed and accidents," was the subject of the paper presented by E. R. Fitch, district engineer Westinghouse Traction Brake Company. He emphasized the importance of good brake performance in providing satisfactory service and showed how improving the brakes and brake rigging assisted in speeding up schedules. He also stressed the importance of brakes in reducing the accident hazard. An abstract will appear in a

I. S. McWhirter, superintendent of equipment Third Avenue Railway System, in his paper which was presented by H. L. Bowman, commented on the use of hand brakes as an important means of preventing accidents and mentioned the generating stop as another resource for the motorman. He also described and gave the advantages of using magnetic track brakes.

The final paper on brakes was read by Hugh Savage, superintendent of equipment Brooklyn City Railroad. Two factors over which the brake designer has no control were discussed by Mr. Savage: The variation in rail surface condition and the unstable equilibrium of passengers who are standing or walking in a moving car.

At the banquet, President Gove, who served as toastmaster, announced that many experiences as a soldier of fortune.

this was the most successful meeting in the recent history of the association. More than 100 attended the day sessions, and some 550 were present at the dinner.

The principal speaker at the dinner was Roland B. Woodward, general secretary of the Rochester, N. Y., Chamber of Commerce. He made an appeal for fair treatment for the mass transportation agencies, showing that this utility is essential to modern city life. Mass transportation is a prerequisite to mass production. The industry, he said, has had many burdens imposed on it that are unfair, and which should be removed, since they are in the end borne by the riders. It must be prosperous in order to give good service. This is the only great industry that has been a laggard in its public relations. As a result the public has not been properly informed. There is more conspicuous ignorance about the business than about any other of which he has knowledge. More publicity is needed to secure public support.

Captain Irving O'Hay, U. S. Army, retired, gave an interesting account of his way, Jr., chairman of the sub-committee on depreciation of the National Relations Committee reviewed the status of the work being done with respect to the matter of depreciation hearings before the Interstate Commerce Commission. Dr. Conway explained that the hearings before the commission on electric railways have been put over until the commission has finished with the re-hearings of the steam railroad and the telephone cases. Further sessions on these rehearings are scheduled to start on March 14.

Dr. Conway reported that his committee has held a number of meetings in the preparation of the electric railway case for presentation before the commission. Data has been received from a total of about 40 companies representing a large proportion of electric railway mileage. It is now estimated that the electric railway case will not come before the commission until sometime in

the spring.

The seriousness of the depreciation hearings to the electric railway industry cannot be over-estimated, according to Dr. Conway and his committee. Information already received from representative properties indicates that an order similar to that applied to the steam roads would produce a large immediate increase in operating expense charges of electric railway properties. This would seriously handicap the present program of improvement and rehabilitation just as the industry is emerging from the series of almost insurmountable obstacles and handicaps with which it became burdened during the post war period. An order such as the commission issued in the case of the steam roads would affect all electric railways, in the opinion of the committee, and would not be limited only to those roads reporting to the Interstate Commerce Commission. If the Federal Commission should issue a depreciation accounting order, Dr. Conway explained, the various commissions which have adopted the Interstate Commerce Commission's classification of accounting, would be very likely to follow any policy with respect to depreciation accounting that the Federal commission might lay down.

The need for setting up adequate depreciation accruals is recognized by the electric railways, in the opinion of the committee, and there is no disposition on the part of the industry to question the commission's authority. It is the inten-tion of the committee to strive for an order which will permit electric railway fares and income to be adjusted gradually so as to make possible the setting up of adequate depreciation accruals without doing this in such a manner as to wreck the industry's credit and prevent it from continuing the process of improvement which it has been making such a valient effort to carry out under the obstacle of inadequate revenues. Dr. Conway reported further that there is no intention on the part of the committee to waive any of the rights of individual members to testify for themselves before the commission.

A report for both the managing di-

American Association News

American Executive Committee Meets in Cincinnati

Success of the plan to encourage state and sectional associations to affiliate with the American Electric Railway Association, which was instituted hy changes made in the national association's constitution at the last convention, was indicated by a report of the membership committee made at a meeting of the executive committee in Cincinnati, Ohio, on Jan. 27 by Chairman C. E. Morgan. Applications of seven sectional associations which are listed elsewhere in this issue were approved at the meeting. Additional applications from the Maryland Utilities Association and the Central Electric Railway Association were received too late to be submitted to the executive committee.

The report of the membership committee, supplemented by a special report from General Secretary J. W. Welsh, also indicates that the plan of consoli-dating the financing of the managing director's office with the general dues of the association is meeting with the approval of the industry as evidenced by the payment of dues to date. It seemed obvious from the figures submitted that the budget estimates for the year, upon which this year's dues were based, were approximately correct, and that the association may expect to complete the current year in sound financial condition if the present trend of dues payments by member companies is maintained.

The executive committee met at lunch-

eon in the Queen City Club as the guests of Walter A. Draper, president Cincinnati Street Railway. Those present at the meeting included the following: R. P. Stevens, president, C. E. Morgan, L. S. Storrs, T. B. MacRae, J. S. Kubu, R. H. Dalgleish, H. H. Norris representing Edward Dana, A. J. Manson representing M. B. Lambert, E. F. Wickwire, T. W. Casey, D. W. Snyder, Jr., Thomas Finigan representing W. S. Cutler, J. R. Fitzpatrick, Robert I. Todd, J. W. Welsh, R. F. Carbutt, F. G. Buffe, H. L. Mitchell, W. W. Holden, H. B. Potter, J. P. Pulliam, P. G. Carlton representing R. B. Stearns, W. S. Rodger, W. E. Wood, W. R. Power, W. A. Draper, Thomas Conway, Jr., Thomas Fitzgerald, Charles Gordon, Claude Van Auken, F. C. J. Dell, Leslie Vickers, G. C. Hecker, C. J. Murphy, Lambert St. Clair.

In the absence of Chairman Paul Shoup, the report of the publicity committee was presented by Mr. Welsh. The principal point being stressed in this year's work is that of the need for an adequate fare by electric railways. The report indicated that good use is being made of the Association's moving picture films which were prepared last year. The entire group of twenty films has been in almost constant circulation since they were prepared.

Because of the fuller attendance at this meeting than at the last meeting of the executive committee, Thomas Con-

rector's office and for the Committee on National Relations was made by Managing Director L. S. Storrs in the absence of Chairman J. H. Hanna. Mr. Storrs said that a number of sections of the Federal Transportation Act are becoming of increasing interest to electric railways as the growth in the freight business of many interurbans brings them more nearly into the classification of railroads. Appointment of C. D. Cass as assistant to the managing director, to handle some of the many duties arising from Washington developments which affect the interests of electric railways was confirmed by the executive committee for such period as his services may be necessary. The expense of this work is being assumed by several properties whose interests in the developments are directly affected.

Mr. Storrs announced the findings of the committee of judges on the Anthony N. Brady Safety Award. The medals in each of three classes were won by the Louisville Railway, El Paso Electric Company and the Tide Water Power Company, respectively. Formal presentation of the awards is to be made at a meeting to be held under the auspices of the American Museum of Safety in New

York, on February 17th.

Activities of the committee on cooperation of manufacturers will, according to a report by Chairman Wickwire, be directed along lines suggested by Managing Director Storrs; i.e., promotion of a basic 10-cent car fare for electric railways. The committee is at present co-operating in the preparation of an album containing pictures illustrating the industry's early days and showing by contrast with newer types of equipment, the progress which has been made.

Resolutions covering conditions to be observed by exhibitors at the annual convention, somewhat similar to those which have governed during several years were passed by the executive committee. These resolutions are printed elsewhere in this issue.

A request by the educational committee, that the educational luncheon which was held under the auspices of the committee at the last convention, be made one of the regular luncheon meetings on the convention program this year, was referred to the program com-

mittee.

Leslie Vickers, economist of the Association, reporting for the committee on taxation, said that an effort has been made in co-operation with other organizations to obtain a reduction in federal corporation taxes. He called attention to a legislative matter of considerable importance to utilities; namely, the amendment to the tax bill by Representative Garner which eliminates from the hill Section 118, which permitted consolidated reports to be filed for several companies. Mr. Vickers emphasized the importance of striving to have Section 118 put back in the hill.

Based upon figures covering the budget for the 1928 Cleveland convention, the executive committee voted to charge a rate of 60 cents per square foot for inside exhibit space at Cleveland. The rate for outdoor track space will be \$2 per lineal foot. These rates were decided upon after a careful analysis of the convention budget and estimates of the probable sale of space. It was the intention of the committee in setting the 60cent rate, to provide an income which would just balance convention expenditures.

Convention committee appointments by President Stevens were read by Secretary Welsh. These were printed in last week's issue of ELECTRIC RAILWAY Journal. Reports of progress being made by the several affiliated associations were made by T. B. MacRae for the Accountants Association, J. S. Kubu for the Claims Association and R. H. Dalgleish for the Engineering Association. Mr. Kubn read a draft of an imputed negligence law proposed by the Claims Association, which President Stevens referred to the policy committee. Mr. Dalgleish was granted authority, upon request of the Engineering Association, to ask manufacturers of new types of electric railway truck drives for contributions not to exceed \$500 each, to defray the cost of tests on new type drives, to be conducted by the Bureau of Standards in Washington.

Representatives from various state and sectional associations attending the executive committee meeting were called upon by President Stevens for brief com-These included F. G. Buffe, ments. Midwest Electric Railway Association; H. L. Mitchell, Pennsylvania Street Railway Association; W. W. Holden, Southwestern Public Service Association; J. P. Pulliam, Wisconsin Utilities Association; R. F. Carbutt, Metropolitan Section; P. G. Carlton, representing R. B. Stearns, New England Street Railway Club; W. E. Wood, Virginia Utilities Association; W. S. Rodger, Central Electric Railway Association and W. R. Power, Kentucky Utilities Association. Mr. Buffe invited the executive committee to hold a meeting in Kansas City at the time of the next Midwest Electric Railway Association meeting there late in May or early in June. A similar invitation was extended by Mr. Holden for the Southwestern Asso-

At the end of the business meeting a review of statistics and trends in the industry was presented by E. J. Murphy, statistician of the Association. The next meeting of the executive committee was fixed for March 30 at Association Headquarters, New York.

Engineering Executive Committee

MANY projects of the Engineering Association were reviewed at a meeting of the executive committee held at association headquarters, New York, on Jan. 30. Members present were President R. H. Dalgleish; vice-presidents F. H. Miller, W. W. Wysor and L. D. Bale; past presidents C. H. Jones, P. V. C. See, F. McVittie, E. M. T. Ryder and G. C. Hecker; and Daniel Durie and Charles Rufus Harte. Committee chairmen H. H. George, H. F. Brown and J. Y. Bayliss were also

Announcement was made that appropriations for the study of rail corrugation by way and structures committee No. 12, car design by rolling stock committee No. 3 and noise reduction by rolling stock committee No. 9 were approved by the executive committee by letter ballot and were authorized at the American Association executive com-

mittee meeting held Nov. 11.

The final report of the subjects committee was approved by letter ballot, and complete assignments for committee work have been sent to all committee members. In connection with the design of a proposed standard track switch for a 200-ft. radius, the question arose as to whether standardization of track switches is necessary or desirable. was decided to go ahead with the design of the switch without reference to standardization.

A report on revision of rules of procedure was made by Mr. Miller. method of taking letter ballots received considerable attention. On motion of Mr. Miller, seconded by Mr. See, it was decided to continue for another twelfth

month the procedure of adoption of standards by letter ballot according to the method used last year.

Announcement was made that a meeting of the committee on revision of constitution and by-laws would be held to bring the constitution and by-laws of the Engineering Association in line with the changes adopted by the American Association at the last convention.

The editing of the association's proceedings was discussed, the idea being to reduce the volume by eliminating all extraneous material and abstracting such papers as do not seem to have permanent value sufficient to place them in the records in full. Since the volume of proceedings for the current year had already been set in type, it was decided to make no change in the form until next year.

It was pointed out that a change in the style of numbers in the engineering manual had been authorized last year so that the new sections do not repeat a number in words and in figures. motion of Mr. Jones, seconded by Mr. Miller, it was decided to make the changes in new sections and those sections which come up for revision so that they will be changed over to the latest form as quickly as possible when reprinting.

The results of a number of letter ballots on Manual sections were reported. A new letter ballot on special track work was approved for submission to the membership. The Manual Committee was authorized to make editorial changes where necessary in one of the Manual

On the subject of convention pro-

sections.

grams, it was voted to appoint committees to prepare programs for each of the main divisions and that the chairmen of the standing committees, with others to be appointed, should constitute a committee to prepare the program for the joint session.

In connection with the presentation of committee work on the convention floor, Mr. George recommended that brief abstracts of each special committee report be prepared so that they can be presented in a minimum time.

The afternoon session of the executive committee was given over to presentation of progress reports by the chairmen of the several divisions and a number of announcements by the secretary.

Several Manual revisions were brought to the attention of the committee.

Mr. Bayliss, chairman of the purchases and stores division general committee, told of joint work that is being done with the Accountants Association. It was voted by the executive committee to approve this arrangement as it was thought that the two groups have much in common and should arrange to do as much work together as they can.

For the heavy electric traction committee, Chairman Brown told of the plans for the year. The work will be along the lines laid down at the last convention. Mr. Brown referred to possible duplication of committee work. This has been referred to in the report of the committee on heavy electric traction.

Mr. See made a brief report on behalf of the rolling stock division telling of the status of the committee work, and Mr. Bale made a similar report for the power division.

A proposal was made to study the application of labor saving machinery in shops. This proposal was discussed at some length. It was thought that such equipment is of great value today, and it was voted to appoint a committee to investigate the value of such equipment.

On the subject of concrete poles, there was a question raised as to the advisability of including special types of concrete poles in the assignments to the proper committee. It was decided to leave this matter until next year.

Considerable time was given over to announcements of the various American

Engineering Standards Committee activities in which the association is interested. Co-operative work being done with the Division of Simplified Practice of the U. S. Department of Commerce and with a number of other associations was also referred to.

Motor Drives to Be Tested

PLANS for testing the most recent type of motor drive were made at the meeting of a sub-committee of rolling stock special committee No. 3 on car design. This meeting was held at the Bureau of Standards in Washington, D. C., on Jan. 19. At the meeting were present Dr. H. C. Dickinson, Dr. M. D. Hershey and S. A. McKee, all of the Bureau of Standards; President R. H. Dalgleish of the Engineering Association; H. H. Adams, chairman of special committee No. 3, and C. Bethel, W. J. Clardy, F. H. Pritcher, C. A. Burleson, N. R. Brownyer, H. C. Maddux, A. L. Kasemeier and J. A. Brooks.

Arrangements for the test were discussed in detail. It was decided that the various elements of the drive units should be tested separately. For instance, universal joints, reduction units, and journal bearings would each be tested for its efficiency, the tests being made from standstill up through the entire speed range. By means of these tests it will be possible to determine the relative efficiencies between journal bearings of the anti-friction type and plain bearings. The tests will be made with the lubricants recommended by the manufacturers and later tests will probably be made with lubricants selected by the Bureau of Standards that will represent as nearly as possible conditions to be met in cold temperatures. Representatives of the Westinghouse Electric & Manufacturing Company and the General Electric Company will look into the matter of supplying motors to be used as dynamometers.

The question of making road tests was left in abeyance for further consideration.

In all seven reduction units were submitted for consideration of the representatives of the Bureau of Standards.

New Association Members

POLLOWING out the plan made possible by a change in the constitution of the American Electric Railway Association, adopted at the 1927 convention, seven state and sectional associations were elected to membership at the meeting of the executive committee held at Cincinnation Jan. 27. Besides these there were two associate members and 33 individuals elected. The list of new association and associate members follows:

ASSOCIATE MEMBERS

American Appraisal Company, consulting engineers, Milwaukee, Wis.

Richard Sachse, consulting engineer, Los Angeles, Cal.

STATE AND SECTIONAL ASSOCIATIONS Arkansas Utilities Association, Little Rock, Ark.

Canadian Electric Railway Association, Toronto, Ont.

Iowa Electric Railway Association, Davenport, Iowa.

New England Street Railway Club, Boston, Mass.

Oklahoma Utilities Association, Oklahoma City, Okla.

Public Utilities Association of Virginia, Richmond, Va.

Southwestern Public Service Association, Dallas, Tex.

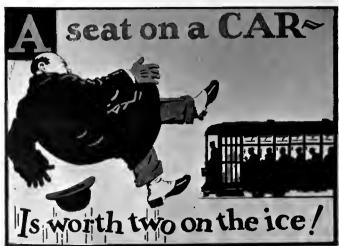
Posters Stimulate Winter Riding

POSTERS to aid in inducing car riding during the winter months have been prepared by the advertising section of the American Electric Railway Association under the supervision of the manufacturers committee on co-operation, of which E. F. Wickwire is chairman.

"It's always fair weather—inside a street car!" and "A seat on a car—is worth two on the ice!" are the inducing words on the attractive posters.

They are being offered to manufacturers as well as to electric railway operators and can be obtained directly from the association's advertising section at a nominal price. A limited quantity will be distributed free to manufacturers.





Attractive posters to stimulate street car riding during the winter months

Maintenance Methods and Devices

Manganese Bridging Plate **Prevents Cupping**

MANGANESE plates, which bridge the rail joint plates to give ½-in. bearing surfaces for the wheels, are used by the Pittsburgh, Harmony, Butler & New Castle Railway. These plates have prevented the usual cupping at the rail ends. Each plate is $3\frac{3}{4}$ -in. high and $\frac{3}{8}$ -in. thick, except for the top face or



The manganese reinforcing plate is secured by two inner bolts

bearing surface, which is \(\frac{5}{8} - \text{in.} \) thick. The manganese reinforcement is secured by two bolts passing through the two inner holes of the joint plates and the end holes of the rail. It is then welded to the bottom flange of the joint plate as shown in the accompanying drawing.

Where the cupping is advanced, the

through the second and fourth holes. The welded bridging plates have been used for two years and have proved satisfactory.

Mr. Fisk says it is "time to retire"-your out of date equip-

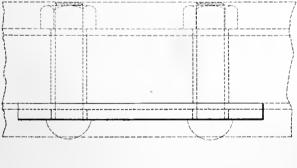
Power Sander Speeds Car Work

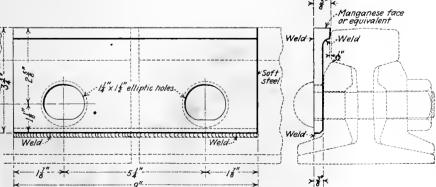
WHERE large surfaces, such as the sides of cars, must be prepared for painting, sanding by the use of blocks covered with sandpaper is slow and tiring to the workman. In the shops of the Twin City Rapid Transit Company, St. Paul, Minn., electric sanders are used largely for this work. The accompanying illustration indicates the method of using the sander.

The sandpaper is placed on a circular plate of steel, which is driven by bevel gearing and a flexible shaft from a small motor. The device is mounted on a portable stand. As the workman moves along the car the motor stand is moved readily by a pull on the flexible shaft. Little difficulty is experienced in keeping plate is secured by bolts passing enough slack so that the rotating

> sander plate may be manipulated with ease.

> With this type of sander it is possible to dress down cars in many instances without the necessity for burning off the paint. The sander is also used for smoothing up the panels from





The plate is welded to the bottom flange of the joint plate and to the upper part of the rail



This motor-driven sander makes the preparation of the car for painting an easy matter

which the paint has been burned off. The sander also can be used wher-

ever sandpapering is required. It does excellent work in smoothing off floors and smoothing off car roofs before the canvas is put on. It is even used on old roofs where the paint has become badly cracked. Where it is necessary to do sandpapering work above the floor level it is an easy matter to suspend the sandpapering machine from an overhead crane or runway so that it can be moved easily.

Punch Used to Form Switch Iron Handles

OOPED switch iron handles are formed on a punching machine in the shops of the Chicago Surface Lines. The equipment used was illustrated in the brief submitted by the railway for the Coffin Award. Two strokes of the forming punch are needed to complete the loop, which is but partially formed at the first stroke. One heat is all that is needed in the forming, since the time lost between the first and second strokes is but a short interval, necessary for turning the piece over.

New Equipment Available

Sleeve Connector

PLUG, socket and tapered sleeve form a three-part connector placed on the market by the Columbia Machine Works and Malleable Iron Company, Brooklyn, N. Y. It is designed particularly for use in connecting motor leads, storage batteries, compressors and other apparatus used by electric railways. The plug section is formed by reducing the diameter at one end, the opposite being bored to two diameters for cable strands and insulation. about the center of this section a thread is cut, which is engaged by the thread of the tapered sleeve. The socket part is bored and reamed, the opposite end being drilled two diameters for cable strands and insulation. The outer diameter of the female end of the socket is turned with a rather abrupt taper and is slotted to form prongs, which are drawn down rigidly on the plug section by the tapered sleeve. With the exception of slotting the socket with a milling machine saw all of the parts are made by lathe turning, and so particular accuracy is insured. The plug and socket parts are soldered on their respective cables and ample threads of the plug and tapered sleeve are provided for wear.

Heavy-Duty Circuit Interrupters

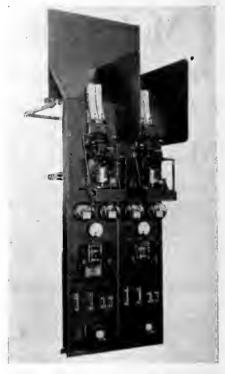
INCREASED demand by railways and other distributors of direct-current power for automatic and semi-automatic substations has made necessary a strong circuit breaker that can interrupt large overloads a great number of times and still be in condition to carry its rated load without overheating and without immediate repairs or cleaning.

This demand is being met by the Westinghouse Electric & Manufacturing Company through the production of its type CH carbon circuit breaker. This breaker is now being made in 2,000, 4,000 and 8,000-amp. ratings, 750 volts. The 2,000 and 4,000-amp. ratings can also be used on 1,500 volts. These breakers are not provided with self-contained overload coils, but can be made to trip on overload by means of relays. They are provided with a closing magnet and a detachable pole handle to close the breaker by hand in case of loss of voltage on the closing circuit.

Feeder breakers are usually provided with a shunt trip which opens the breaker when the short circuit detector operates to energize the coil.

The type CFI circuit breaker has a very wide opening between the arcing contacts when in the open position and the opening between the stationary contacts and the brush is also large, making it impossible, especially in the pedestal type, for the arc gasses to hover close enough to the live parts to maintain an arc between the moving and stationary contacts when opening a short circuit of any magnitude that can be produced by any existing concentration of direct-current rotating machines.

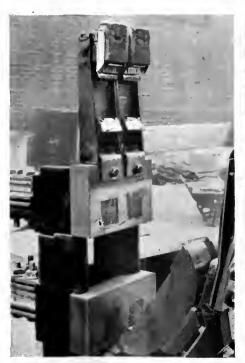
Through the courtesy of L. D. Bale, superintendent of power Cleveland Railway, the Cedar Avenue substation was made available for testing the CH breakers. An accompanying illustration shows the condition of the moving and stationary contacts after 260 operations opening 20,000 to 30,-000 amp. at 600 volts. The Cedar Avenue substation has eight 1,500kw., 600-volt rotary converters, all of which were running. The fact that the converters at Cedar substation were of a design without high reluctance commutating poles and consequently were liable to flashovers if subjected to too great an overload, together with the necessity of giving



Switchboard with two 4,000-amp. CH circuit breakers

first consideration to the facilities of the railway, prevented placing of greater overloads on the breaker.

The 4,000 and the 2,000-amp. CH breakers have also been tested for interrupting capacity in the Westinghouse high power direct-current laboratory on overloads up to 40,000 amp. with similar results to the tests made in Cleveland.





Contacts after opening 20,000 to 30,000 amp. 260 times.
At left—Stationary contacts. At right—Movable contacts

News of the Industry

Little Progress on Boston Bill

THE bill calling for a 15-year extension of the public control of the Boston Elevated Railway will not have as smooth sailing through the Massachusetts Legislature as was expected. Many complications are developing. The first hearing on the bill was regarded as unsatisfactory since only a small amount of information was brought out to guide the legislative committees.

At the suggestion of Governor Fuller and others the committees have voted to ask the Boston Elevated directors and some of the leading stockholders to appear at a public hearing to give their views on the merits of the pending bill, and on the future of the road. The governor also suggested that the committees should call Joseph B. Eastman, chairman of the Interstate Commerce Commission; James F. Jackson former chairman of the Elevated board of public trustees and of the Massachusetts Department of Public Utilities, and Andrew Marshall, a former member of the Elevated board of trustees and others.

There is much sentiment on Beacon Hill in favor of a return of the property to the owners, and also for the immediate acquisition of the road by the state.

The redeeming feature of the present situation is that the Legislature took hold of the question as the very beginning of the session and will have plenty of time to deliberate over it and decide upon some solution. A feeling seems to be developing in the western part of the state that the Commonwealth should not do too much for the Boston Elevated unless it is willing to do the same for electric railways in other parts of the state. The country senators and representatives are inquiring along this line.

Bureau to Send Out Virginia News

The Virginia Public Utility Information Bureau has recently been organized with headquarters in Richmond. Allyn B. Tunis is director.

Baltimore Fare Decision Deferred

Final decision in the application of the United Railways & Electric Company, Baltimore, for an increase in fare from 7½ to 10 cents has been delayed by the Maryland Public Service Commission until after Feb. 10. Hearings in the case were concluded in December.

Before acting on the fare case the commission will determine the valuation of the company's easements. This valuation was placed at \$7,000,000 by the commission last summer, but the case

was carried through the courts. The Maryland Court of Appeals ruled that the commission should value the easements but said that the method used was wrong. So the case went back to the state body.

Franchise Extended Again in Chicago

Another 30-day extension of the franchise of the Chicago Surface Lines has been granted by the City Council. This extends the franchises until Feb. 29.

Schenectady Fare Hearing Postponed

Hearing before the Public Service Commission scheduled for Feb. 1 at Albany on the petition of the Schenectady Railway, Schenectady, N. Y., for permission to increase its fare rates has been postponed. Postponement was due to the application by the city for a writ prohibiting the commission from proceeding with the question. The city alleged that rates on some lines were fixed by franchise restrictions.

Seven-Cent Fare Asked in New York

Interborough Rapid Transit asks commission for that rate, failing which it will seek court aid. The company sets up claim of confiscation

DIRECTORS and officers of the Interborough Rapid Transit Company, New York, have reached the conclusion that definite action must be initiated by them by filing 7-cent fare schedules to secure for the company's investors and for the public substantial relief from the conditions now existing. The company takes the position that the policy of the city of New York and the attitude of the Transit Commission thus far, under the advice of special counsel to that body, have brought about conditions which compel protective measures in public interest. It says:

A rate of fare of 7 cents per passenger on each subway division and Manhattan division operated by the Interborough company will constitute no more than a just and reasonable rate of fare on each division respectively and will yield no more than a fair and reasonable return upon the value of the properties actually used by it in the public service in its operation and devoted to the public service and no more than a reasonable compensation for the service so rendered.

In order to aid in the preparation and presentation of the matter along the lines which have been recognized and upheld by the courts as to other public utilities, ex-Justice William L. Ransom, who has had considerable experience in that field, has been retained as counsel. He will assist counsel for the company in bringing before the Transit Commission and the courts the facts which have impelled the company to action.

The company has repeatedly pointed out to the public authorities the urgent need that it be permitted to charge fares and earn revenues which will reflect the present price level and enable the company to meet with maximum efficiency the needs of those dependent on its facilities. It contends that all of its efforts to induce fair and businesslike

consideration of the pressing problems have led only to violent political attacks and to drastic threats of oppression, designed still further to destroy the company's credit and its ability to fulfill its obligations to its patrons. A statement by the company says:

Under these well-known circumstances the directors of the company have decided to take the necessary steps to exercise and establish the rights of investors and patrons. The matter will be removed from the forum of vituperative assertion and harangue, and the pertinent law and facts definitely established. Our expectation is, of course, that the Transit Commission, in its quasi-judicial capacity, will treat the matter fairly and diligently, as the urgent conditions demand: but we squarely face the probability that the right of this company to charge a fare which will enable it to perform its public functions and escape confiscation will be brought before the courts for clarifying review and for final determination, unless the action of the Transit Commission is along lines which make that review unnecessary. The steps now taken have proved to be the only way of dealing with the extremity to which we have been forced.

The petition filed with the Transit Commission tells its own story and summarizes the grounds of the company's application. The company cannot continue to render a 1928 service at 1928 costs of materials and rates of pay of labor, at a rate of fare fixed in 1913, based upon the wages, costs and purchasing power of money then prevailing. Every business man knows the force of the economic conditions which compel this change in fares. The orders of the Transit Commission, the threats of its special counsel and the radical change in the city's policy since 1913 have intensified and aggravated the effects of the changed price level.

The Interborough Rapid Transit Company does not desire to charge more or less than the rate of fare which will conservatively enable it to pay proper wages and meet present-day operating costs, together

with an adequate return upon the property devoted to the public service, in order that its credit may be so restored that it may procure sufficient new capital for improvements. It is unwilling longer to impair its service by trying to skimp along on revenues less than its fair right. Like other public service companies, it should charge neither more nor less than a reasonable fare, based on elements recognized by the courts, and subject to revision downward or upward as costs and conditions require.

That is the established and generally recognized right of other public service companies, with excellent results for the public by way of first class and adequate service. We believe it is likewise our right

and our duty to seek it.

It should be remembered that in no event can the company make a dollar of profit from an increased fare in excess of the amounts which it is entitled to retain under the terms of its contracts with the city

As the purchasing power of the 1928 dollar is approximately 60 cents, it will be appreciated that a 7-cent fare has a purchasing power somewhat less than the

5-cent fare of 1913.

2 per Cent Participation Earned by Philadelphia Men

The co-operation of employees of the Philadelphia Rapid Transit Company, Philadelphia, Pa., during 1927 has earned them the 2 per cent of P.R.T. gross earnings promised for added efficiency. President Senter says, however, that even greater effort will be necessary to earn a similar added wage in 1928.

The closing months of 1927 brought a falling-off in earnings because of depression in industrial activity. Mr. Senter said:

We must be wide awake to the need for economy in every department, so that operation may be kept at the lowest cost consistent with good service. At the same time we must do everything possible to increase riding. A more attractive service will largely offset a temporary loss in normal riding. You can make car, bus and cab riders out of people who now use their private automobiles or walk. Attractive service means constant courtesy, regular spacing of cars, clean and bright equipment, and the thousand and one added touches which nobody knows so well as the man on the job.

Once we had the transportation field to

Once we had the transportation field to ourselves. Now the private automobile is striving with us to serve the public's transportation needs. We are in a battle. Speed, comfort, economy and convenience are our

weapons.

Let us fight hard, but let us at the same time stick to the rules of the game. While putting our own best foot foremost let us not trip up the other fellow. This means that we must give a square deal to all users of the city streets—the 20 per cent who use their own private cars, as well as the 80 per cent who depend upon us for transportation. In helping others we help ourselves, and that goes in heavy traffic as truly as anywhere else in life.

Subway for Milwaukee

A half-mile subway and rapid transit line on an east and west right-of-way unobstructed by street crossings and arranged to improve greatly street car traffic conditions was announced on Jan. 31 by S. B. Way, president of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

The plans for the immense improvements, to cost in excess of \$4,000,000, have been submitted to Mayor Hoan and have been approved by him and within a few days will be sent to the Common

Council for its approval.

The new right-of-way will run from a junction on the rapid transit lines on Fortieth Street east generally along the north bluff of the Menomonee valley, entirely free from both grade crossings and street traffic, to a point on Eighth Street north of St. Paul Avenue. At this point the subway will begin.

From Eighth Street and St. Paul Avenue all trains operated over this line will run underground into the Public Service station at Third and Michigan Streets. In addition to the subway the line will have two stretches of elevated tracks, 500 feet across Hibernia Street and 1,100 feet on St. Paul Avenue east of Twenty-fifth Street. The entire length of the new project is 2.8 miles.

Running Street Car in Window Big Attraction

A miniature street car in a window of the Arkansas Power & Light Company's offices in Little Rock, Ark., that actually ran up and down a track representing Main and Fifth Streets of the city attracted favorable attention recently. There was a guessing con-

test in connection with the event, which was a part of the traction company's big advertising campaign to center attention upon the electric railway system. The car actually ran 95 miles, but guesses ranged from a fraction of a mile to 1,000,000 miles.

Group Insurance for Wisconsin Valley Employees

The Byllesby group insurance plan covers all employees of the Wisconsin Valley Electric Company, Wausau, Wis., and its subsidiaries effective Jan. 1, 1928. An announcement to this effect was made recently by H. L. Geisse, general manager of the company.

W. H. Montross, general superintendent, will supervise this insurance work on all properties of the company. There are 324 employees eligible for

this insurance.

Being Neighborly in Elmira Paid

"What's wrong with our service"? And then followed an avalanche of complaints, vituperation and even profanity. That was fifteen years ago in Elmira, N. Y. But with that discouraging beginning Frederic H. Hill, vice-president of the Elmira Water, Light & Railroad Company, laid the foundations of good will so that today its officers are in demand as speakers in schools, at luncheons and at community groups. The answer as told by Mr. Hill in the December issue of Nation's Business is "keeping a public utility human." Today the company can boast of successful customer-ownership campaigns, a personnel with good home talent operating its services sometimes on part time and in school vacation periods.

As an example of co-operation on the part of the employees he said that in a recent drive to stimulate interest in better home lighting 63 per cent of the employees took part. An average of more than six cartons of frosted lamps per employee was sold, the railway department selling the most. Among the leaders were five conductors. Some of the trainmen had become well acquainted with their passengers and sold many lamps on the cars.



Window display depicting street car operation in Little Rock attracted much favorable attention

Of course, there are some complaints in Elmira, but they are a matter of routine. However, there are no longer any tricks "because we are not soulless."

85,248 Handled in Rochester Subway in Month

Passenger traffic on new subway railroad in the bed of the abandoned Erie Canal at Rochester, N. Y., totaled 85,248 for December, its first month of operation, James F. Hamilton, president of the New York State Railways, operators of the railroad, has announced.

In view of the limited operation of the subway so far, part time service only being maintained, railways officials expressed gratification over the showing for the first month.

Passengers within the city totaled 59,680, while those on the Rochester & Eastern interurban line, which uses the subway, totaled 25,568.

It is expected that installation of the automatic signal system, lack of which

Governors Deliver Annual Messages

Emphasis laid on transit before Massachusetts body—Governors of New Jersey, North Dakota, Virginia and Rhode Island report

AN ECHO of Governor Smith's idea of transportation as a factor in community life, mentioned in his annual message and referred to in the ELECTRIC RAILWAY JOURNAL issue of Jan. 7, 1928, was heard in the words of Governor Alvin T. Fuller of Massachusetts in his address to the Legislature of Massachusetts. He said that he regarded the Boston Elevated Railway situation the paramount problem before the Massachusetts Legislature this year. That public control through public trustees would enable prompt carrying out of many needed improvements and additions, and would bring the system up to that degree of efficiency and accommodation to which the metropolitan area was entitled was his belief. Generally

quate communication with the city of York, Westchester and Long Ñew Island, and the intrastate or local problem. He said it was clear that the creation of new, intrastate suburban passenger facilities in northern New Jersey were bound up with the interstate passenger problem. The Suburban Transit Engineering Board was actually functioning and developing an engineering plan. An encouraging point was advice that the Legislature of New York would follow the initiative taken by the state of New Jersey and would pass complementary legislation, enabling the Port Authority to proceed.

Lying, as it does, between the great metropolitan areas of New York and Philadelphia, New Jersey must care for traffic passing between these two states and having its shore line on the Atlantic Ocean for a distance of more than 150 miles, developed as resorts, it must likewise make ample provision for the

traffic created thereby.

Other states whose governors made reports to the Legislature during January included North Dakota, Virginia and Rhode Island.

Governor Harry Smith Byrd told the General Assembly of Virginia, convened in regular session on Jan. 11, that the gasoline tax had vindicated those who were in favor of this tax for the purpose of building roads rather than floating bond issues. For 1927 at least \$7,500,000 would be collected, and should go in 1928 into more than \$8,-000,000. The total road funds available for the next biennium, namely \$32,-004,680, was an increase of \$1,100,000 available for street highway systems over the last two years. His report showed the assessments of the physical properties of each class of public service corporations for the years 1925, 1926 and 1927. For 1927 the assessment on electric railroads was \$10,289,179: for 1926, \$10,937,086, and for 1925, \$10,-574,866.

Motor vehicle transportation had made remarkable advancement since its regulation by the state, and sections of the state formerly isolated and inaccessible were now in easy and quick communication with adjacent communities.

Governor Aram J. Pothier of Rhode Island told the General Assembly at its annual January session that highway development was to continue so that the traveling public might share in the desired and desirable improvements.



Type of car operated on new subway at Rochester by New York State Railways

is preventing complete operation of the line, will be completed by Feb. 15. When this work has been finished, two-minute trolley movement will be possible. Fifteen-minute service has been in order under the present experimental stage of the subway operation, with only two cars running. Mr. Hamilton said:

When the installation of the automatic signal system is completed, it will be possible to operate cars according to the demands of traffic. A clear track one or two stations ahead will be indicated by green lights; yellow lights will indicate distance of only one station clear. Red lights mean stop.

The Rochester & Syracuse and the Rochester, Lockport & Buffalo interurban railways will use the subway as soon as switching installation and signal work are finished. Special work is required for the Rochester & Syracuse connection because that line is double tracked on right-track operation while the subway railroad is on left-track operation.

Informative Pamphlet on Illinois

"Know Illinois," the second edition, compiled by the Illinois Committee on Public Utility Information, has been circulated far and wide. This booklet gives in condensed form some important statistics about Illinois.

speaking, he favored a short rather than a long extension of public control. He suggested careful consideration of the problems of additional subway facilities so as to reduce the burden on the car rider. He said that he would be happy at all times, and whenever convenient, to collaborate in the preparation of a bill that would be fair to the traveling public without being unfair to the stockholders, and which would, at the same time, provide for the extension of the rapid transit system and improve transportation facilities. There was no one thing before the Legislature with the opportunity of doing so great a service to large numbers of people as the proposed legislation, which had as its object, improved transportation facilities for the metropolitan district.

Across the Hudson River, Harry Moore, Governor of New Jersey, addressed his second annual message to the 152nd Legislature of New Jersey on Jan. 10. He stressed the necessity for improvement of facilities for carrying commuters to and from New York City. The problem could not be solved by the state of New Jersey alone but had to be co-ordinated with improved transit facilities for New York City, West-chester County, Long Island and Staten Island. Two problems before the state of New Jersey were the regional or interstate problem—the matter of ade-

Chicago Parking Issue Under Advisement

Court hearings on the injunction proceedings relative to parking in the loop district of Chicago, Ill., which were in progress on Feb. 1 have been concluded and the case has been taken under advisement until next week. The parking decree went into effect on Jan. 10. The various steps in the introduction of this ordinance and its passage have been followed in the Electric Railway Journal.

Municipal Ownership Suggested for Tacoma

Purchase of the railway system owned by the Tacoma Railway & Power Company, Tacoma, Wash., by the city of Tacoma, was urged at a recent banquet of the Young Men's Republican Club of Pierce County, by S. A. Perkins, Tacoma, candidate for republican national committeeman, and prominent newspaper owner. Mr. Perkins declared that if Tacoma had acquired its railways fifteen years ago "even paying five times the price they were worth, the city would be twice its size today," to say nothing of the benefits realized in avoiding the conflict at the city hall with the company during the past few years.

Four-Cent Wage Increase in Atlanta

An increase in wages just negotiated under a new contract between the Georgia Power Company and the Amalgamated Association, Atlanta, Ga., provides a wage of 50 cents an hour for the first nine months, 55 cents for the second nine months, 58 cents an hour thereafter, with a 7-cent differential for operators of one-man cars. This scale will continue until May 1, 1929, at which time a new schedule of wages will be drawn up.

The new scale is retroactive from Jan. I, 1928. It means that motormen and conductors on two-man cars receive an increase of 4 cents an hour, and operators of one-man cars an increase of 3 cents an hour. All employees in the mechanical and roadway departments will receive an increase of 2 cents an hour.

Under the old scale motormen and conductors received 46 cents an hour for the first nine months of their employment, 51 cents an hour for the second nine months and 54 cents an hour thereafter. Since May 15, 1927, one-man operators have received 54 cents the first nine months, 59 cents the second nine months and 62 cents thereafter.

"The Public Servicer" to Appear Feb. 5

The Public Servicer is the name selected for the monthly employees magazine published by the St. Louis Public Service Company, St. Louis, Mo. It is the successor to the old U. R. Bulletin published by the defunct United Railways which ceased operations on Nov. 30, 1927. The first issue will be off the press on Feb. 5.

To secure a name for the new magazine the company offered cash prizes for the best title suggested. More than 350 replies were received. William Schwartz, an employee of the materials yards, won the first prize of \$25. The second prize of \$10 went to Edward Phelps, a company night watchman, who suggested The Booster.

while Miss Marie Page, a daughter of a company conductor, won the third prize of \$5. She suggested Trolley Flashes.

Higher Fares Don't Mean More Revenue, Los Angeles Hears

In a "memorandum" brought forth during the hearing on the application of the Pacific Electric Railway, Los Angeles, Cal., for higher fares, A. F. Mott, chief engineer of the California Railroad Commission, suggested three experiments on a limited scale and for a limited period of time in an effort to increase the revenue of the Pacific

Electric Railway system.

First among these was the establishment of a Sunday and holiday pass, good within a radius of approximately 30 miles from Los Angeles, for unlimited use on any of the company's lines on the day for which it was soldthe price of this pass to be \$1; second, the establishment of an off-peak low one-way rate in addition to the present established rate. The off-peak hours were given as between 9 a.m. and 4:30 p.m., and between 7 p.m. and midnight. A tryout might be made on the Venice-Santa Monica Lines; third, the establishment of a monthly pass good between Los Angeles and certain designated points, carrying with it the privilege of unrestricted use, not only on the interurban lines between the points for which sold, but also the privilege of unlimited local use within the primary zone of each terminal joint —the charge beeing about the charge for the present 60-ride commutation ticket.

Engineer Mott concluded by saying that the Pacific Electric should give "serious attention" to preventing the automobile from making further inroads on its business, and if possible, to win back to the fold patrons now using the automobile. He did not believe that fare increases were a means of increasing railway revenue.

The report contains figures of the effect of the Glendale experiment with lower fares. However, Mr. Mott admitted that the Glendale plan, although it had proved a "reasonable" individual success, did not absolutely prove that fare reductions of the same type would bring similar results over the remainder of the system. Fare reductions on the Glendale-Burbank line averaged II per cent.

"Riders That Do Not Count for 'More Revenue' "

The Virginia Electric Power Company, Richmond, Va., has reproduced a picture in the January Vepcovian, its house organ, showing the various coins passengers slip over for fares. They include a 2½-cent piece from Panama, a 2-cent piece from Mexico, a mutilated nickel, an aluminum slug, a 4-cent piece from Italy, a 2½-cent piece from Hungary, a brass campaign button and a brass drinking cup check.

Transit the Topic of the Hour in Philadelphia

A proposal for a new \$50,000,000 transit development linking West Philadelphia, Pa., and Camden, N. J., by a high-speed line, was offered on Jan. 30 by Mayor Mackey of Philadelphia. This proposal was one of the features of an outline for the coming four years of his administration presented at a luncheon for the mayor and his directors by the Philadelphia Chamber of Commerce. His transit policies include, besides the link over the Delaware River Bridge, the Philadelphia Rapid Transit Company operation of the Broad Street subway beginning on Sept. 1 under a short-term agreement; Locust Street instead of Chestnut Street for subway; the Ridge Avenue-8th Street Loop, and the Randolph Boulevard for wide thoroughfare between Fifth and Sixth Streets as a bridge traffic feeder.

As an aid toward financing the proposed West Philadelphia-Camden highspeed line the Mayor said the Phila-delphia Rapid Transit Company was willing to enter into an agreement prior to submission of the forthcoming \$40,-000,000 loan bill to the voters to pay interest and sinking-fund charges on that amount. He announced that the company had withdrawn its proposal that after it had by its payments, discharged the debt incurred for construction of an East-West subway, it should become owner. As outlined by Mr. Mackey, the city would retain permament ownership. With the company willing to pay \$40,000,000 of the entire \$50,000,000, the rest could be charged against earnings of the Delaware River Bridge.

On Jan. 27 Director Myers advised the Mayor that the recommendations of the Philadelphia Rapid Transit Company for changes in the City Hall Station and the underground walks of the South Broad Street unit of the subway were essential to adequate operation of the \$100,000,000 line. His estimate of the city's outlay for the extensions was \$6,000,000 and said that item, with Mr. Mackey's approval, would shortly be submitted to the City Council for inclusion in the April electorial loan.

He concurred in the suggestion of Ralph T. Senter, president of the Philadelphia Rapid Transit Company, that the city spend \$250,000 for establishment of the feeder lines to the upper stretch of the subway, with the Philadelphia Rapid Transit Company making an outlay of \$750,000.

Mr. Myers' report divided into five sections followed a conference with Thomas E. Mitten, chairman of the board of directors of the Philadelphia Rapid Transit Company, and a group of Eighth Street merchants, at which Mr. Mitten told them that the proposed Ridge Avenue extension of the Broad Street subway would be included in the plant worked out for operation of the city-built line. Another development was Mayor Mackey's announcement that the Broad Street subway would be ready for operation some time in August.

Recent Bus Developments

Stringent Regulations in New York for Safety Sake

To insure the safety of passengers in public buses operated by carriers under certificates of convenience and necessity issued by the New York Public Service Commission, that body will require all bus operators before putting a bus conveyance in operation to submit a statement showing the type and character of buses used, type of heating equipment, form of notive power and type of brake equipment. Where a bus operator buys and operates a bus which has been in use before, the commission requires that it be notified of the mileage to date, the physical condition and other information which may be pertinent in the interest of safety.

Higher Tax on Connecticut Buses

The Connecticut Company, Hartford, Conn., has filed suit in the Superior Court to prevent the city of Hartford from taxing its 26 buses. In the petition it is claimed that the taxes paid on the buses in the State are in lieu of all other taxes to municipalities making the city's tax illegal. A plea in abatement and to the jurisdiction has been filed by the city in which it is alleged that the Connecticut Company has not appealed from the doings of the assessors to the board of relief, as provided in the statutes. The city moves for this reason to ask that the case be thrown out of court on the grounds that the Superior Court is without jurisdiction in the case at this particular

The Connecticut Company states that since 1922 it has paid 3 per cent of its gross earnings within the State to the State, less certain deductions.

The city has assessed the buses for \$95,000 and laid a tax of \$2,011 on them as follows: \$1,916 for city tax and \$95 for school tax.

Expansion by Los Angeles Railway

Figures for 1927 show that the operations of the motor coach division of the Los Angeles Railway, Los Angeles, Cal., increased about one-third over 1926.

Two entirely new lines were added, Mines Avenue and Whittier Boulevard line and the Crescent Heights Boulevard line, 8.75 miles of new coach route. There were 2.43 miles of extensions, making a total of route mileage increase for year a little more than 11 miles and total miles of route 65.

Five double-deck and twenty singledeck coaches were added to the service, making a total of 119 after deducting

None of the above figures includes

the Los Angeles Railway's interest in the Los Angeles Motor Coach Company.

During 1927 the new repair shops, a building more than 300 ft. long, of the most modern design, was completed. A new service station was also completed for filling coaches with gasoline.

A modern washing system has been installed and is nearly completed.

Plans have been drawn for a new motor coach division headquarters.

Accounting Classification for Wisconsin

Motor carriers there divided into two classes under new accounting plan. Digest of provisions of code

UNIFORM classification of ac-Acounts for motor carriers has been prescribed by the Railroad Commission of Wisconsin effective on Jan. 1, 1928. For the purpose of the classification motor carriers are divided into two classes. A and B. Class A companies are those with operating revenues that exceed \$100,000. In Class B are companies with annual operating revenues exceeding \$15,000, but not more than \$100,000, or those jointly operated in connection with a Class A or B utility as heretofore defined by the commission and having a revenue of less than \$15,000 annually.

A uniform system is prescribed for all classes of companies, for balance sheet accounts, fixed capital accounts, income accounts, profit and loss accounts, and operating revenue accounts. In the case of operating expense accounts two groupings are prescribed. Class A companies are to keep 39 accounts and the smaller companies only 21 accounts.

Under this classification depreciation charges are considered a part of the general and miscellaneous group, but in making up the standard form of income statement, depreciation must be shown separately along with uncollectible bills and taxes assignable to operations. In other words, depreciation and taxes are treated as income deductions. Rents are likewise treated.

The grouping of the revenue and expense accounts follows closely the classification adopted by the National Association of Railroad & Utilities Commissioners and the American Electric Railway Accountants' Association. Mention should be made of the group entitled "garage operating expenses" which covers fuel, lubricants, garage employees, and garage supplies and expenses. Operating expenses lead off with the group of maintenance accounts, followed by garage operating expenses, transportation, traffic and general and miscellaneous. The revenue accounts correspond with those prescribed in other standard classifications both as to individual accounts and arrangement.

The arrangement of the balance sheet is new. Fixed capital accounts follow the arrangement of the standard classification except with regard to the method of handling "cost of property and equipment purchased," which is carried as a suspense account until such time as the cost is assignable to fixed capital accounts. Provision is also made for fixed capital accounts maintained prior to the time the new classification is put into effect.

Houston Line Will Be Continued

Because of protests from residents of Bellaire, Tex., the Houston Electric Company has decided to ahandon its plan for withdrawing bus service from that territory. Plans to discontinue the service were based on insufficient returns and heavy expenses. The bus is operated by the Houston Electric Company through a contract with the Westmoreland Farms Company, which in turn had an agreement with Bellaire property owners.

Court Acts in Seattle-Tacoma

Differences between E. Krakenberger of Tacoma, Wash., and the Pacific Northwest Traction Company, a subsidiary of Puget Sound Power & Light Company, Seattle, Wash., over their respective rights to provide bus service have been carried into the State Department of Public Works and the Thurston County Superior Court.

Mr. Krakenberger has been granted permission by the Department to provide motor passenger and express service over the new Pacific Highway between Seattle and Everett. Similar permission was refused the electric interurban between Seattle and Everett, and Seattle and Tacoma. As a result, the railway secured from the Thurston County Superior Court a writ of review which takes precedence over the Department of Public Works' order denying the company's permission to operate stage service over the new highway. In granting the petition for review, Superior Judge John M. Wilson issued an order restraining Mr. Krakenberger from operating on the new route until litigation is closed. Mr. Krakenberger has also announced his intention of invading a new field and has applied for permission to give motor bus service on the new highway between Seattle and Tacoma.

Substitution on New Jersey Line

Permission has been granted to the Public Service Railway to discontinue railway service on its Broadway route south of Gloucester City, N. J., and the Public Service Transportation Company, its subsidiary, has been authorized by the commission to substitute bus service for trolleys between Camden and National Park and Woodbury and Blackwood.

Steam Railroad Secures Charter for Subsidiaries

Governor Fisher of Pennsylvania signed the charter of the Reading Transportation Company on Jan. 27. Stock control in the company is held by the Reading Company, which will own 1,965 of the 2,000 shares of common stock. Officers of the Reading Company are incorporators of the subsidiary. Previous approval had been obtained from the Public Service Commission before the Governor acted. The commission in its decision held that the Reading must secure sanctions for each separate bus route it plans to establish.

During the hearings before the Publis Service Commission the Schuylkill Railway and its bus subsidiary appeared as protestants. This company operates electric railways out of Pottsville, Pa., and vicinity. It contended that the Reading planned to invade its territory. After it had been overruled by the commission the electric railway appealed to the Superior Court. The case was dismissed. The Supreme Court then denied an appeal from the Superior Court decision. The steam railroad must still prove to the satisfaction of the Public Service Commission that public necessity and convenience require any service it may contemplate installing, so recourse is still open to the electric railway to protest any plans by the steam carrier for installing service which the electric railway might regard as competitive or unwarranted.

The first effort on the part of the Reading to get its subsidiary chartered in Pennsylvania was unsuccessful. Shortly before leaving office more than a year ago Gifford Pinchot, then Governor, declined to approve the charter. At that time the Pennsylvania Railroad had an application pending to organize a bus subsidiary with a capital stock of \$500,000. Mr. Pinchot refused to approve the incorporation of both companies. The Pennsylvania Railroad was asking the right to run buses for freight and passenger service in 55 of the state's 67 counties.

Buses in Savannah Accommodate Steam Railroad Employees

A bus service to transport employees of the Atlantic Coast Line Railroad shuttle train operating between the yards on East Broad Street, and the shops at Southover Junction, Savannah, has been arranged with the Savannah Electric & Power Company. The new service is a substitution for the shuttle train discontinued. The contract made with the Savannah Electric & Power Company was let after bids had been received from a number of concerns.

The Savannah Electric & Power Company secured buses in this service. These are of the latest standard city car type, one having a seating capacity of 29 passengers, and the other 21 passengers. The larger bus is operated during the daylight hours, and the smaller

bus during the night hours. The buses handle only employees of the Atlantic Coast Line Railroad. Due to the many employees at the shops one shuttle train will be operated in each direction in the morning and afternoon.

Several months ago the railroad announced that it had determined to withdraw the shuttle train as soon as definite arrangements could be made for the operation of a substitute service.

Extension of Bus Service in Jacksonville

Bus service to the residents of Murray Hill is to be given by the Jacksonville Traction Company, Jacksonville, Fla. Two buses will be used for the new line. This proposed service was referred to previously in Electric Railway Journal.

Bus Purchase in Ohio

The Cleveland-Akron-Canton Bus Company, a subsidiary of the Northern Ohio Power & Light Company, Akron, Ohio, has purchased the Blue Line Transit Company operating between Canton and Dover, Ohio. Equipment valued at approximately \$25,000 is included in the deal.

New Schedule on Missouri Interurban

A new schedule which will cut down the number of buses operating between Excelsior Springs and Kansas City, Mo., is to be put into effect by the Kansas City, Clay County & St. Joseph Railway and bus companies. Under this plan Excelsior Springs will have hourly service to the city alternating between buses and the interurban line.

More Bus Feeders in Chicago

The Illinois Commerce Commission has ordered the Chicago Surface Lines to establish bus feeder service on Diversey Avenue from Milwaukee west to the city limits, and on Belmont from Central Avenue to the city limits.

The Surface Lines now operates a feeder bus line on Diversey Avenue from Crawford to Laramie, and the new order would extend this service east and west, connecting it with one of the important diagonal street car lines to the northwest.

A 7-cent fare is charged and transfers are granted between buses and street cars,

No action has been taken by the commission on the petition of 40,000 residents on Addison Street to have a feeder bus service established by the Surface Lines along that street.

During the week ended Jan. 28 Mayor William Hale Thompson vetoed the City Council's authorization of the establishment of this bus service on Addison Street.

Buses on First Street, San Diego

Buses are to be used by the San Diego Electric Railway, San Diego, Cal., to replace cars on the company's First Street line. Under the bus plans a 10-minute headway will be maintained between 6 a.m. and 7 p.m. as compared with 15 minutes headway on street cars. The line will operate as a unit of the railway system, with transfer privileges to every other line. G. E. Mason, general manager of the railway, is reported to have said:

The tracks and paving on First Street have been in poor condition for some time and, until recently, we had expected to replace the tracks and continue railway operation because of the large volume of passengers being handled on this line.

The standard type of bus was not considered suitable for this line. However, due to recent developments, a new aspect has occurred in transportation views and new possibilities have been opened up in bus operation through the adaption of larger capacity vehicles. After considerable investigation and actual operation of the newly-developed bus on our own property we have been convinced that this service will prove practical for use on the First Street line.

The bus is known as the twin coach. In appearance it is similar to a street car. It has a seating capacity of 40 passengers and is provided with front and rear large doors so passengers can get on and off with a minimum of delay, as contrasted with the use of the small single door on the average bus. It is driven by two engines, both underneath the floor and in the center of each side. Thus the whole street space occupied by the bus is utilized for passenger carrying and is much more efficient and causes much less congestion than the older types of buses with their large projecting hoods and fenders.

We believe the residents along the First Street line will welcome the change from street cars to this new and delightful type of equipment drawing up to the curb, as it does, to receive and discharge its passengers and for the further fact that, under bus operation, we will be able to provide much closer headway, that is, much more frequent service because of the flexibility of the new equipment.

Another Way to Relieve Traffic in South Bend

Permission to operate a supplemental motor freight service within South Bend was granted the Chicago, South Shore & South Bend Railroad by the Indiana Public Service Commission. Freight now is transferred between two freight terminals of the road by freight cars, and the institution of a motor truck and trailer service will help to relieve congested traffic conditions.

Bus Extension in Quincy

The Quincy Street Railway, Quincy, Ill., is preparing to supplant its present North Fifth Street line with buses on the completion of the repaving of that district. Five additional buses are included in the 1928 budget of the company anticipating and providing for this extension of the motor service, making a total of 20 buses in operation in the city.

Financial and Corporate

New Jersey Details Arranged

Public Service Co-ordinated Transport begins to function as consolidation of railway and bus companies

PUBLIC Service Co-ordinated Transport-a new company formed by the consolidation of Public Service Railway and Public Service Transportation Company, Newark, N. J.-was created on Jan. 31 when the certificate of organization was filed with the Secretary of State at Trenton. Earlier in the day the stockholders of the two companies adopted the agreement of merger, submitted to them by the directors of both companies.

The main purpose of the consolidation is the co-ordination into one operating unit of the two companies which have heretofore operated the railways and buses. Instead of dividing the responsibility between two companies, the one company will hereafter operate both services, with the object of effecting greater economies and efficiency, redounding to the advantage of the public as well as to the stock and bondholders.

The consolidation will also bring an improvement in financial structure, including the possibility of an open-end mortgage making it easier to secure new capital for extension and betterment of facilities. As Thomas N. Mc-Carter, president, pointed out when the first announcement of the proposed merger was made, the benefits of this character of consolidation have been demonstrated in the merger of the electric and gas companies into Public Service Electric & Gas Company in 1924.

The certificate of organization specifically states that the new corporation "shall have and possess, and may use, exercise and enjoy all the rights, powers, privileges and franchises of the said corporations, parties to this agreement."

Furthermore, that: "All and singular, the rights, privileges, powers, stock, property, whether real, personal or mixed, railways and franchises of each of the parties thereto, shall vest in the co-ordinated corporation immediately upon the adoption of this agreement by the stockholders of the said corporations, according to law, and the filing of this certificate, or a copy thereof, with the secretary of state."

It is also provided that the new corporation "may issue its stock, common and preferred, may make, issue and dispose of bonds or other obligations in order to carry out the purposes of the consolidation; to pay and discharge bonds, mortgages and encumbrances upon any of the property of the consolidated companies."

The financial procedure involved in the consolidation is, briefly, as follows: Provision is made for the issuing of 2,500,000 shares of no par value common stock and 487,500 shares of noncumulative preferred stock of no par value. Preferred stock will have no voting rights but will receive dividends at the rate of \$6 per annum per share, for such years as in the judgment of the board of directors such dividend is justified and before dividends are paid on common stock. In the event of the dissolution of the company its preferred stock shall be entiled to a division of the assets at the rate of \$75 a share, before the common stock receives any part of the assets.

Under the terms of the agreement the 487,500 shares of no par value common stock of Public Service Railway outstanding will be exchanged for 487,500 shares of non-cumulative preferred stock of Public Service Co-ordinated Transport, and the 1,004,500 shares of common stock of Public Service Transportation Company outstanding for the same number of shares of common stock of the company.

Directors and officers of the new corporation follow: Directors, Thomas N. McCarter, Samuel T. Bodine, Thomas S. Gates, Anthony R. Kuser, Alfred L. Loomis, Uzal H. McCarter, Arthur W. Thompson, Landon K. Thorne, Edmund W. Wakelee and Percy S. Young.

Officers, Thomas N. McCarter, pres-

Omcers, Thomas N. McCarter, president; Percy S. Young, Edmund W. Wakelee, John L. O'Toole, George Barker, Matthew R. Boylan, vice-presidents; Charles M. Breder, secretary; William H. Feller and William T. W. T. Crudge, assistant secretaries; T. W. Van Middlesworth, treasurer; Frederick A. Neis, Robert S. Tomkins and F. Milton Ludlow, assistant treasurers.

These men have occupied similar positions with the two merged companies.

Grand Rapids Gross Increases

Economy and modernization methods of Grand Rapids Railroad result in reasonably satisfactory position for 1927 operation

THE number of revenue passengers carried on the lines of the Grand Rapids Railroad, Grand Rapids, Mich., during 1927 decreased 5.96 per cent below 1926. Gross earnings naturally were affected and decreased \$95,595, compared with those of the preceding These decreases were due principally to an unexpected slowing down of manufacturing activities in the city's largest industry, namely, furniture making. This condition operated to the detriment of street car patronage but owing to the steps taken by the management in installing a new type of car on various lines, the savings realized from lower operating costs more than offset the decline in gross earnings. As a result, gross income after operating expenses and taxes for the year 1927 showed an increase of

\$20,262 over 1926. This was part of the story of the year's operation as disclosed in the report to the stockholders for the eight months ended Dec. 31, The board of directors submitted the eight months' statement and one for the calendar years 1926 and 1927, of which 1926 and the first four months of 1927 cover operations by the predecessor.

In accordance with the plan of reorganization of the Grand Rapids Railway dated April 11, 1927, the present company was incorporated under the laws of Michigan on April 15, 1927, and as of May 1, 1927, acquired all of the assets and assumed all of the indebtedness of the former company, including its outstanding bonds. A total of \$146,800 in par value of 7 per cent preferred stock (out of an authorization of \$300,000) and all authorized common stock consisting of 100,000 shares without par value were issued. The outstanding debenture bonds were reduced by \$355,000 and the entire

GRAND RAPIDS STATEMENT FROM MAY 1, 1927, TO DEC. 31, 1927

Gross Earnings:	
Passenger revenue	\$1,034,243
Revenue from apecial cars	1,477
Rent of equipment and tracks	34,322
Non-operating revenue	1.637
Trou-operating revenue	1,021
Total	\$1,071,679
Operating expenses and taxes:	
Operating expenses	657,416
Taxes	81,487
Total	\$738,903
	\$2,70,700
Gross income available for fixed charges,	
dividends and retirements	332,776
Interest on funded debt	162,957
Interest on unfunded debt	7,344
Total	\$170,301
Net iocome	162,474
Dividends on preferred stock	6,841
Provision for retirements	81,105
Balance	\$74,529
Ratio of operating expenses to gross earn-	
ings	61.34
Ratio of operating expenses and taxes to	
gross earnings	68.95
Revenue passengers carried	11,665,803

STATEMENT OF EARNINGS OF GRAND RAPIDS RAILROAD

Gross earnings:	1927	1926
Passenger revenue	\$1,627,157 1,893	\$1,724,395 3,480
Rent of equipment and tracks Non-operating revenue	44,375 1,925	38,035 5,036
Total	\$1,675,351	\$1,770,947
Operating expenses and taxes: Operating expenses Taxes	\$1,005,642 133,495	\$1,108,709 146,287
Total	\$1,139,138	\$1,254,996
Gross income available for fixed charges, dividends and retirements	\$536,213	\$515,950
gross earnings	60.03	62.60
Ratio of operating expenses and taxes to gross earnings Revenue passengers carried	67.99 18,378,036	70.87 19,542,920

floating indebtedness aggregating \$606,-333 was provided for. In addition to the cash realized as a result of the plan, \$200,000 in principal amount of first mortgage sinking fund 7 per cent bonds due May 1, 1939, were sold, so that the net reduction in the total bonded debt was \$155,000.

An initial quarterly dividend of $1\frac{3}{4}$ per cent was paid on the 7 per cent preferred stock (all of which was subscribed for by preferred stockholders of the old company) on Aug. 1, 1927, and quarterly dividend No. 2 was paid

on Nov. 1, 1927,

No change was made in the rates of fare in effect during 1927, namely, 10 cents single cash fare, and six tickets for 50 cents. According to the terms of the franchise, the company is entitled to earn at these rates a return of $7\frac{3}{4}$ per cent on the value of the property after deduction of operating expenses, taxes and provision for retirement reserve.

A total of \$95,303 was expended during 1927 for additions and betterments. The larger portion of these expended to the second se penditures was for the purchase of 10 second-hand Birney single-truck, one-man operated safety cars and remodeling them in conformity with the standard Grand Rapids type of cars.

Bus service is rendered as supplemental to and in co-ordination with that rendered the public by the street railway system. It is intended to extend bus service to territory not now served by street cars, whenever conditions so justify.

Steps taken in conjunction with other organizations in the city to promote public safety work bore favorable results in 1927. The expenditures for injuries and damages in 1927 amounted to only 1.11 per cent of the transportation revenue. The continued use of loading platforms and safety zones has been beneficial and together with the safety campaign conducted has reduced the number of avoidable accidents between automobiles and street

Mention is made in the report of the distinction conferred upon the company by the Charles A. Coffin Award for the year 1927.

Would Lease Three Illinois Electric Railways

The Illinois Terminal Corporation applied to the Interstate Commerce Commission on Feb. 2 for permission to take long-term leases on three electric lines in that state. It proposes to operate the St. Louis, Troy & Eastern, the St. Louis Electric Terminal Railway and part of the main line of the Illinois Traction, Inc. The first two corporations control much shorter roads than Illinois Traction. Increased efficiency in operation and elimination of duplication in service and terminals were said to be the reasons for the proposed consolidation. All of the leases would run for 99 years with rental rates based on the amount of property involved.

Receivership Ahead in Tacoma

Petition expected to be filed with court soon. Scott Z. Henderson suggested for place

PETITION for a receiver is expected to be filed in the federal court in Tacoma early in February by bondholders of the Tacoma Railway & Power Company, Tacoma, Wash. Representatives of the creditors met on Jan. 24 in New York, with Mayor Tennant and Scott Henderson attending, and unanimously decided to apply for receivership. This action has not been unexpected, as negotiations between the City Council and railway officials had come to a point where it seemed a revaluation of the railway properties was inevitable. The company management had been asked to determine whether the bondholders and stockholders would agree to a valuation of \$3,000,000 for rate-making purposes instead of the \$6,700,000 approximately allowed by the state.

PUGET SOUND RAILWAY ALSO INVOLVED

Moreover, the fact that the Tacoma companies defaulted in their last interest payments on bonds and may do so again this spring indicated probable receivership. The Puget Sound Electric Railway, which by ownership of \$600,000 of common stock of the Tacoma Railway & Power Company is the controlling interest, also is reported in financial straits. That company has announced that it will no longer advance sums to meet interest payments for the Tacoma company. The Puget Sound Electric Company, operating an interurban line between Tacoma and Seattle, is in turn a subsidiary of the Puget Sound Power & Light Company, under Stone & Webster direction.

STATEMENT IN BEHALF OF COMPANY

Meanwhile, Richard T. Sullivan, manager of the company at Tacoma, in a bulletin to all employees indicates that he expects little if any change in the operation of the lines, and declares there will be no interruption of the orderly operation of the transportation system. The schedule of fares now in effect has been authorized by the State Department of Public Works until the last of May. Mayor Tennant, in a telegram from

New York to the Council, looks upon the receivership as a means of obtaining an orderly settlement of the Tacoma transportation problem. His telegram is as follows:

In meeting with a committee representing the creditors of the Tacoma Railway & Power Company at the Pennsylvania Hotel, New York, it was decided that in the best interests of all parties concerned an immediate receivership of the company should be petitioned for under federal court jurisdiction.

It was also unanimously agreed to recommend to the court at the proper time that Attorney Scott Z. Henderson be appointed

as receiver.

In my opinion, with the hearty co-operation which I am sure the citizens of Tacoma are ready to give the course outlined, this offers a prompt and orderly solution of our

entanglements which have hampered and embarrassed us in the past.

Therefore, I am authorized to inform the citizens of Tacoma of this contemplated

Lynchburg and Roanoke Properties Sold

Confusion caused by newspaper announcements is cleared up by an official statement from George N. Tidd, president of the American Gas & Electric Company, that, while retaining the electric light and power business in Roanoke and Lynchburg, Va., and the Lynchburg gas plant, which have for some time been operated by the Appalachian Electric Power Company, the American Gas & Electric has sold the Roanoke Railway & Electric Company, the Roanoke Traction & Light Company and the Lynchburg Traction & Light Company, operating electric railway lines and bus lines.

The new owners are the Central Public Service Company, Chicago, which also recently purchased the Rockford Electric Company and railway and bus lines in Wildwood, N. J., Huntington, W. Va., Ashland, Ky., Portsmouth, Ohio, and Ironton, Ohio, from the Amer-

ican Gas & Electric Company.

Franchise of Pennsylvania Property to Be Sold

The corporate franchise of the Pennsylvania & Maryland Street Railway, operating from Salisbury to Meyersdale, a distance of 7 miles, will be offered for public sale through Receiver H. S. Wilhelm, at the courthouse in Seneca, Pa., on Feb. 4. This is in pursuance of the decree of the Court of Common Pleas. The sale is for the purpose of divesting a mortgage given by the railway to the Farmer's Loan & Trust Company, New York.

In 1924 the company abandoned the 5-mile line between Meyersdale and Garrett, Pa. Some months ago the franchise became the property of the Associated Gas & Electric Company by virtue of the acquisition of the Meyersdale Electric Light Company of Meyers-

Baltimore Easements Valued at \$5,000,000

A valuation of \$5,000,000 was placed upon the easements of the United Railways & Electric Company, Balti-more, Md., by the Maryland Public Service Commission on Feb. 1. The previous figure fixed by the commission was \$7,000,000. The latest decision, therefore, finds the total value of all property of the company, including easements, to be \$75,000,000 as of Dec. 31, 1923.

An order was passed by the commission stating that the fair value for ratemaking purposes of the United property on Dec. 31, 1923, was \$75,000,000 and this valuation shall become final unless protest is filed within ten days, The remainder of the order passed by the commission on March 9, 1926, is

unchanged.

The controversy over the value of the easements came up in 1926 when the commission fixed the valuation at \$7,000,000. At that time the United claimed a value of \$18,184,954. Clarence W. Miles, then People's Counsel, contended that no value whatever should be placed on the easements. When the \$7,000,000 value was placed he appealed to the courts and the commission was upheld in a decision handed down by the Circuit Court of Baltimore City. Mr. Miles then carried the case to the Court of Appeals of Maryland. The appeal resulted in the court handing down a decision sustaining the principle of allowing a value for easements but holding that in using assessment values for fixing the value of the easements the commission actually had used values which contained the element of earning power. The court remanded the case, without affirmance or reversal of the decree, for further proceedings. An agreement followed by which the case was returned to the commission for rehearing. This latest action then followed.

Would Abandon Ohio Line

The Northern Ohio Power & Light Company, Akron, Ohio, has applied to the Ohio Public Utilities Commission for the permission to abandon its line and remove its tracks between Canton and North Canton, a distance of 6 miles. It has also filed application for abandonment of service between North Canton and Akron. Hearing has been set for March 13. The Cleveland-Akron-Canton Bus Company, a subsidiary of the Northern Ohio Power & Light Company, is now operating buses over the highway between Akron and Canton.

Seven reasons are named in the application to the commission. They are:

1. Operation of the line has been unprofitable for several years, and losses are increasing.

2. The Akron-Canton highway is to be paved to nearly its full width, necessitating removal of the tracks.

3. The company has been requested by the Commissioners of Stark County to get off of the highway.

4. The County Commissioners and the company have been unable to agree on new franchise terms.

5. All franchises for the operation of the

line have expired.

6. Other transportation along the route is adequate, and maintenance of the line is not needed for the public's necessity and

7. Facilities for hauling freight between the two cities have been arranged.

Removal of this branch of the company's interurban line will not affect service on any other part of the system. For many years the company has maintained an hourly schedule between Akron and Canton. The Akron-Canton line has been operating for approximately 25 years.

Surplus in Cleveland Subject to Tax

Decision rendered by United States Board of Tax Appeals will be carried to courts

Surplus earnings of a public utility, though accumulated for the sole purpose of making possible a reduction in rates, are subject to federal income and excess profits taxes. The United States Board of Tax Appeals has so ruled in a case appealed by the Cleveland Railway. By a twelve to four decision, the board held that the railway must pay \$470,000 additional taxes for the years 1918 to 1921 inclusive.

An appeal will be taken to the United States Circuit Court of Appeals, according to Joseph H. Alexander, president of the company. The law department of the city of Cleveland, which joined in the hearing before the tax appeal board, will join in the appeal to the courts. The case may reach the United States Supreme Court on constitutional

questions.

The dispute arose from the unusual provisions of the Tayler franchise, under which the Cleveland Railway operates. Under the terms of this franchise stockholders are guaranteed a 6 per cent return and surplus earnings above the amount needed to meet this charge are used to provide a barometer fund under which fares are varied in accordance with the amount in the fund. when the fund goes below \$500,000 the fare automatically goes up, and when the fund goes above \$1,100,000 the fare automatically goes down.

The company contended that the money put into the interest fund was not subject to taxation, because the carriders of the city, upon whom the burden ultimately falls, are in fact a political subdivision under the meaning of the revenue law and therefore entitled to relief from that burden.

The majority opinion of the board, written by Chairman Benjamin H. Littleton, stated that while it is undoubtedly true that the levying of the tax in question will impose a burden upon the petitioner, which in turn will mean a burden to the car-riders, this is not a burden upon a political subdivision within the meaning of the law. opinion said:

The burden is not on the city of Cleveland as such. No income is derived by it from the operations of the petitioner, nor is it required to pay any of the petitioner's expenses, be they taxes or otherwise. car-riders of the city of Cleveland and its suburbs are in no sense a political subdivision, but are merely members of a community, or of several communities, which use the transportation facilities of the petitioner. The burden would indirectly fall upon them in their individual capacities, but not upon a political unit or subdivision in its sovereign or governmental capacity.

To carry the petitioner's argument to its logical conclusion would mean to exempt the petitioner from all tax, since to levy any tax on this corporation would be to increase the cost of transportation, which in turn means increased car fares and,

therefore, imposes a burden on the community of car-riders to that extent.

A dissenting opinion was prepared by Examiner William R. Green, Jr., before whom the original arguments in the case were submitted. Mr. Green pointed out that receipts accumulating in the interest fund are not subject to the will of the corporation, that they may not be distributed and that their use is limited by provisions of the Tayter franchise. He added:

In them the petitioner has nothing definite, nothing tangible, nothing usable in the way of income. Their accumulation is a matter of no interest to the petitioner because no advantage is gained thereby. No gain or profit results from such an accumulation and it lacks several of the essentials of true income under the sixteenth amend-

City's Engineers Fix St. Paul Value at \$14,865,180

Averaging three separate and varying findings by three civil engineers employed by the City of St. Paul, Minn., it is estimated by Corporation Counsel A. A. Stewart that the present value of the St. Paul City Railway is \$14,865,-180, with 20 per cent depreciation. This is to be the contention by the city in the forthcoming hearing of the railway before the Minnesota Railroad and Warehouse Commission for an increase in fare. The company's own estimate is \$16,503,557. The commission's valuation finding four years ago on an 87 per cent hasis was \$16,196,090.

Each engineer presented two sets of figures—one the depreciated condition of the property without allowance for any except physical wear, the other making some allowance for obsolesence for track where changes in street structure will require its removal.

To the report of the engineers was added three additional items set up by the commission: \$1,000,000 going concern value, \$100,000 working capital and \$870,513 land values. Mr. Stewart said:

These figures will of course be disputed by the company's engineers, but assuming that they are adopted by the commission a 7 per cent return would require that the company earn over and above its operating expenses \$1,500,000 a year. The company last year fell short of this more than \$300,000. It earned not quite 5 per cent on a \$15,000,000 value.

If the relief suggested in the charter amendment is granted the earnings of the company would be approximately 6 per cent on \$15,000,000. The earnings of the Minneapolis company amount to approximately 7 per cent on the commission's value without any additional depreciation

since 1924.

Even if the commission should adopt the city's present contention as to the depreciation value of the property it will be necessary to grant the relief proposed by the charter amendment in order to bring the earning capacity of the St. Paul company up near the earning capacity of the Minneapolis company.

The city engineer experts are W. L. Darling, formerly chief engineer Northern Pacific Railroad; Max Toltz and L. P. Woolf.

Legal Notes

Iowa—City Not Responsible to Street Railway for Expenses in Change of Grade,

A statute in Iowa says that when any city or town changes the grade of any street, so as to injure the value of any improvement made by any person on the street, according to the previously established grade, the city shall pay to the owner of the property so injured the amount of the damages inflicted. This was held not to cover a street railway on the street, which was obliged itself to defray the cost of the necessary alterations to its double track on a street whose grade was changed by the city. [Des Moines City Railway vs. City of Des Moines, 216 N.W., 285.]

Massachusetts.—Boston Elevated Bill Declared Constitutional.

In two opinions the Supreme Judicial Court answered eleven questions propounded by the State Senate and 24 questions by the House of Representatives relating to the constitutionality of a bill extending the lease to the Commonwealth of the properties of the Boston Elevated Railway and continuing public management and operation. An extended abstract of these opinions was published on page 998 of the issue of Electric Railway Journal for Nov. 26, 1927. [In re opinion of the Justices, 159 N.E., 55 and 70.]

MISSOURI — Court Defines Care Required of Automobilists at Railroad Crossings.

In a crossing accident, even where the steam railroad train did not give the statutory signals, the railway may offer contributory negligence as a defense to show that the failure to give the signals did not cause the injury. A railroad is a signal of danger, and if to look or listen will enable one approaching a railroad track to see or hear an approaching train, failure to look or listen is negligence as a matter of law. An automobilist in approaching a crossing should operate his car at such a rate of speed that he can readily stop after reaching a point where he can see an oncoming train and before coming within the danger zone. If objects obstruct his view or noise interferes with his hearing, his conduct must meet these conditions. Otherwise he is negligent. [Maclay vs. M. P. Ry., 299 S. W., 626.]

New Hampshire—No Warning Necessary to Passenger Leaving Moving Car.

The conductor on an open car is under no duty to warn a passenger leaving it before it stops of possible irregularity of movement in stopping, since passengers are assumed to have general knowledge of the danger of leaving a moving car. Where a passenger knows the danger of the situation and is able to avoid it, the carrier is not held to so high a standard of care as that which it must use to protect passengers from dangers of which they are ignorant and cannot themselves avoid. [Wright vs. B. & M. R.R., 139 A., 370.]

New Jersey—Passenger Injured While Closing a Broken Window.

A passenger was injured by being cut by glass falling from the window when he was attempting to close it. The glass in the window was cracked before the attempt was made. The court held that he was not contributorily negligent per se in not calling the motorman of the one-man car to close the window, even though he had already observed that the window glass was cracked. [Russell vs. P. S. R. Co., 139 A., 322.]

New York—City Requiring Relocation of Poles for Construction of Its Railroad Must Compensate Electric Company.

In the construction of an elevated portion of the New York Rapid Transit System, the City of New York acted in a proprietory and not in a governmental capacity. Hence, it was required to compensate an electric company for the expense to which it went in removing and relocating its poles and lines caused solely because they would interfere with the construction and operation of the railroad. Such poles and lines constituted property of which the electric company could not be deprived without just compensation. If the removal and re-location had been necessitated by a regrading of the street or any other purpose necessary for the usual use of the street by the public for public street purposes, the cost of the change would have had to have been borne by the electric company. [N. Y. & Q. E. L. & P. Co. vs. City of New York, 224, N. Y. Sup., 564.]

OH10—Certificate for Extension of Bus Line Should Not Be Allowed Where the Extension Overlaps an Existing Route.

Two bus companies operating in uncompeting territories petitioned for extensions. These extensions, if granted, would overlap each other and one would overlap part of the existing line of the other. The Supreme Court of Ohio held that where each applicant was prepared to meet all the requirements essential in a proposed service the opinion of the Commission should be accepted as to the one to be the grantee. However, it notified the Commission to shorten the extension requested by the grantee so that it would not overlap the existing line of the other company. [Cooper Bus Co. vs. P. U. Commission of Ohio, 158, N.F., 543.]

Pennsylvania — Responsibility for Defective Paving Placed.

Even in the absence of a contract, a street railway company is under the implied duty to keep in proper repair the portions of a highway occupied by its tracks. A person injured because of a defect in this paving may sue either the municipality or the street railway company. If he chooses the latter, the one ultimately liable, and fails to recover, he cannot later sue the municipality for the identical negligence. [Brobston vs. Borough of Darby, 138 At., 849.]

Texas — Damages to Property From the Construction and Operation of Railway.

Damages for depreciation of the value of a homestead, caused by the construction and operation of a railroad in close proximity to it, not common to the public generally, are recoverable. This principle, long recognized by the Texas courts, was held to apply to property in close proximity to a trestle built by an interurban railway, as it was claimed that the value of the property was depreciated by the noise and vibration caused by passing trains. [Texas Interurban Ry. vs. Halford, 299 S.W., 277.]

West Virginia—Court May Award Certificate to Motor Carrier Without Referring Cases Back to Commission.

independent motor carriers applied for certificates of convenience and necessity between certain points. One of these applications was opposed by an electric railway company serving the same general territory which offered to install a bus extension to give the same service. The other certificate was similarly opposed by an existing steam railroad, offering through its bus subsidiary to give the service proposed between those two cities. Award of certifi-cates by the State Railroad Commission to the independent bus companies was set aside by the Court in favor of the subsidiaries of the steam and electric railroads on the ground that the public policy of the state, as expressed in legislative enactments, requires that public utilities be given reasonable protection from detrimental competition. Therefore, when an existing carrier is one of several applicants for the initial permit to operate motor buses over a highway between points served by its lines, and it is fully qualified to render the additional service proposed, the State Road Commission should ordinarily give preference to the carrier. Priority of time and application, while an element to be considered, is not ordinarily of sufficient importance to control the granting of a certificate. [Monongahela W.P. P. S. Co. et al. vs. State Road Commission et al., also B. & O. R.R. et al. vs. same, 139 S.E., 744 (two cases).]

Personal Items

F. J. Foote President C.E.R.M.M.A.

F. J. Foote, recently elected president of the Central Electric Railway Master Mechanics' Association, is superintendent of power and equipment of the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio. In his present capacity he is responsible for the maintenance of the cars, shops and substations of that company, and the buses of the Dayton & Columbus Transportation Company, which is affiliated with the electric railway.

Mr. Foote has been identified with the property that centers in the city of Springfield since 1909. Previous to his affiliation with the company, then known as the Ohio Electric Rail-



F. J. Foote

way, he was employed as electrical engineer by the Allis-Chalmers Company, Milwaukee, Wis., and the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Mr. Foote is a graduate of the University of Illinois and did post-graduate work at the University of Wisconsin. In the latter institution the degree of electrical engineer was conferred on him in 1902.

The association of which he has recently been elected president is composed of the mechanical department officers or the men responsible for maintenance of rolling stock and shops of the various companies who are members of the Central Electric Railway Association. He was one of a small group of men who organized the association of which he is now the head.

P. J. Raver Goes to University

Paul J. Raver, estimating engineer for the Chicago Surface Lines, Chicago, Ill., has joined the staff of the Institute for Research in Land Economics and Public Utilities of Northwestern University, Evanston, Ill. This was announced by Dr. Richard T. Ely, director of the institute. Mr. Raver

also becomes a lecturer in the public utility courses in the school of commerce of Northwestern.

Mr. Raver's practical experience began in the engineering, accounting, and transportation departments of the Lincoln Traction Company, Lincoln, Neb. During the valuation of that property in 1919, he joined the staff of Hagenah & Erickson, engineers and appraisers in Chicago, where he was in charge of the valuation of the Central Illinois Light Gompany of Peoria, the Central Illinois Public Service Company properties and other public utilities. In 1922, he was made engineer of estimates for the Chicago Surface Lines.

The school of commerce of Northwestern University granted him the degree of master of business administration in June, 1927, for graduate studies carried on during the preceding three years. Mr. Raver obtained his bachelor's degree in engineering at the University of Nebraska in 1917.

E. C. Bassett Appointed General Passenger Agent at Buffalo

Earl C. Bassett, traveling passenger agent has been appointed general passenger agent for the International Railway and International Bus Corporation, Buffalo, N. Y. Mr. Bassett succeeds J. E. Wilmot, recently promoted to passenger traffic manager.

Mr. Bassett was engaged in railroad work with the Erie Railroad before going to Buffalo.

J. K. Choate Resigns from J. G. White Management

Joseph K. Choate has resigned as director and vice-president of the J. G. White Management Corporation, New York, effective March 31.

N. E. Drexler Succeeds C. D. Porter at Newport News

Norman E. Drexler has been named acting manager of the Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va., succeeding C. D. Porter, who resigned as vice-president and general manager to accept a similar position with the Omaha & Council Bluffs Street Railway, Omaha, Neb. Mr. Drexler has been manager of the gas and electric departments of the company since 1925.

Since Mr. Drexler's graduation from college he has been with the Newport News & Hampton Railway. Gas & Electric Company. He served as assistant engineer, master mechanic assistant chief engineer and assistant superintendent of transportation. In 1916 he was acting chief engineer of the Baltimore & Annapolis Short Line Railway and after that became chief

engineer of the Newport News & Hampton Railway, Gas & Electric Company.

Mr. Drexler's construction activities included the tracks, bridges and overhead of the Hampton & Langley Field Railway and the Hilton extension of the Newport News & Hampton Railway. Mr. Drexler was born in Green Island, N. Y., in 1891. He was educated in the grammar schools of Troy and at the Troy Academy. He received the degree of C.E. from the Rensselear Polytechnic Institute, 1912.

A. R. Williams New General Manager in Providence

Alonzo R. Williams, counsel for the United Electric Railways, Providence R. I., has been appointed general manager of the company, succeeding Edgar J. Dickson, who resigned a few months ago. As general manager, Mr. Williams will be responsible for the transportation department, and also all details on



A. R. Williams

transportation and public relations that come before state, county and city authorities and civic organizations.

Mr. Williams has been connected with the law department of the company and its predecessor, the Rhode Island Company, since 1902. He was closely associated with the late Henry Hayes, Lefferts Hoffman and Frank T. Easton in handling legal affairs for that company. For more than 25 years he has represented the Rhode Island Company and the United Electric Railways in actions at law in both State and Federal courts.

A direct descendant of the founder of the State of Rhode Island, Mr. Williams was born in Providence on Oct. 20, 1877, the son of the late Alonzo Williams, for many years a professor at Brown University. He received his early education in the public schools of Providence. He is a graduate of Brown University. He also studied in Germany, France and Italy and at Harvard Law School. Leaving Harvard, he entered the practice of law.

Mr. Williams enlisted in the Rhode Island Militia in 1897 and was retired after 27 years with the rank of colonel, by act of the General Assembly.

Mr. Williams recently announced that he was a candidate for a Superior Court judgeship which it is expected the Legislature will create at its present session. Following his promotion by the United Electric Railways, he said he would continue his candidacy. In taking up his new duties he made an appeal for co-operation of the company's patrons.

No Change in New Jersey Officers Under Consolidation

Matthew R. Boylan, vice-president in charge of operation of both the Public Service Railway and the Public Service Transportation Company, Newark, N. J., will retain for the new consolidated company, Public Service Co-ordinated Transport, the same staff as presided over the various branches of the two merged companies, which includes: Arthur T. Warner, general manager in charge of traffic; Martin Schreiber, general manager in charge of plant; Louis P. Baurhenn, director of personnel; Edward A. Tuson, general auditor.

The division managers will assume similar duties in the new company, namely, James M. Symington, Essex: William H. Shepherd, Hudson: Joseph C. Rutledge, Passaic; J. Walter Wright, Bergen; Philip F. Maguire, Central;

George A. Rothery, Southern.

J. E. Wilmot Becomes Buffalo Passenger Traffic Manager

President Yungbluth of the International Railway, Buffalo, N. Y., announced the appointment of J. E. Wilmot on Jan. 28 as passenger traffic manager for the International Railway and International Bus Corporation of Buffalo, N. Y. Mr. Wilmot, formerly general traffic solicitor, succeds Clarence E. Mitten, who leaves for Philadelphia, where he will take charge of the new business department of the Philadelphia Rapid Transit Company and associated companies.

Mr. Wilmot is a native of New York City. He is well-known in Buffalo and vicinity through his former connection with the Western New York Motorbus Lines and the Rochester-Buffalo Motorbus Line. Previous to his going to the International Railway he had five years' experience with the White and three years' with the Mack companies, makers of buses and trucks. For the past year he has been engaged as general traffic solicitor, with head-

quarters at Niagara Falls.

H. P. Lesswing Heads Buffalo Co-operative Association

Harold P. Lesswing, an electrician, has been elected president of the International Railway Co-operative Association, representing the 3,000 employees of the company in Buffalo and western

New York. He succeeds William E. Murphy.

Maxwell H. Sherman, operator on the Broadway division of the local lines in Buffalo, was elected vice-president of the organization.

Kentucky Association Elects Samuel Riddle

The latest honor for Samuel Riddle, vice-president of the Louisville Railway, Louisville, Ky., is his election as president of the Kentucky Association of Public Utilities. This distinction was conferred upon him at the final session of the convention of that body on Jan. 19. Mr. Riddle is well-known in Louisville and in transportation circles throughout the country. He has been associated with the Kentucky property since 1910 when he became superintendent of transportation. Some years later he was made vice-president



Samuel Riddle

and when duties were realigned in 1925 he continued in that capacity.

Mr. Riddle was identified with many railway properties before his connection with the Louisville Company. In 1903 he was in charge of the erection of buildings and installation of equipment for the Connecticut Railway & Light Company. Later he was connected with the Rhode Island Company, the Chicago, South Bend & Northern Indiana Railway and the Philadelphia Rapid Transit Company.

Mr. Riddle was graduated from Swarthmore College, Pennsylvania, in 1897 with the degree of bachelor of science and engineering. In the fall of that year he became associated with Dr. W. A. Drysdale, consulting and mechanical engineer, Philadelphia. He continued in that capacity for five years. Later he went with the engineering department of the United Gas Improvement Company, Philadelphia, All these facts and others have been told from time to time in the pages of ELECTRIC RAILWAY JOURNAL. By now everybody knows "Sam" Riddle, who has been identified with many activities in the city of Louisville, including the Louisville Board of Trade, Rotary Club and Engineers and Architects'

America Seen Through Foreign Eyes

Australian official thinks maintenance better abroad than here. Many trolley cars out of date

R. MacLEAN, chief draftsman chief electrical engineers' branch, New South Wales Government Railways and Tramways, Sydney, Australia, spent several days in New York during the week ended Jan. 21 upon his arrival from Europe, where he has been studying local transportation in the principal cities of Great Britain and on the continent. He left Sydney last summer in company with W. L. Ada, power superintendent of the same company, and has visited the larger cities in the United States, Canada, Great Britain, France and Germany. Mr. Ada met with an accident in London and was forced to return home from there, but Mr. MacLean came back to the United States and will sail for Sydney from Vancouver about Feb. 8.

One of the objects of the trip was to study the latest developments in car design. In Sydney, due to the temperate climate, cars are of the cross-bench type with a large number of doors on the sides. Mr. MacLean believes that type of car for the present conditions makes it possible to load and unload passengers in a minimum of time. doubts that it would be possible at present to go to the American type of car either of the center entrance or end entrance types. He stated, however, that the problem at Sydney was changing due to the advent of the rapid transit system and also to the ever-increasing vehicular traffic, and that at some time in the future it may be necessary to use a different type of car. In this event he prefers the American practice rather than the European. He does not favor the double-deck car for the system with which he is connected.

Mr. MacLean was very much interested in the methods of loading cars and handling passengers in the United States, and in the traffic congestion problems here. He feels that when the parking problem in this country has been solved, the United States will have gone a long way toward solving the traffic congestion situation. He also believes it may be necessary to resort to the segregation of various kinds of vehicular traffic in order to obtain the most efficient use of the streets.

Upon his return to America after his visit in Europe, Mr. MacLean came to the conclusion that both equipment and track are far better maintained abroad than here. He believes that in this country there is considerable opportunity for the improvement of track conditions.

As for cars, Mr. MacLean feels that noteworthy improvements have been made in this country for the comfort and convenience of passengers, but is impressed with the fact that too many old cars are being operated. They do not correspond favorably in appearance with the modern motor buses or cars.

Manufactures and the Markets

and Mountain States

Business and industry in the North Central States entered the new year with a rather optimistic outlook. cember witnessed subnormal rates of operations in some of the basic industries, but many of these industries reported that new orders for future de-livery had improved materially. The livery had improved materially. iron and steel industry is on the upward trend, and operations in the motor car manufacturing plants is distinctly upward. 1928 should be a record year in the production of new automobiles and trucks.

Coal output in the section continues to be restricted, but general construction continues on a high scale and gives every indication of improving. High stock prices have compensated very largely for the decline in grain prices from last summer. The first week of the new year witnessed an increase in bank clearings of about 13 per cent over the first week in January, 1927. The underlying trend and sentiment are distinctly upward.

The year closed with business conditions in the Mountain States materially upward, volume of trade higher, flour mills and sugar refineries busy, copper output increased, crops and prices favorable, and livestock conditions excellent, and the coal strikers returning to work. Manufacturing, however, was generally quiet, coal production curtailed by strike, building quiet, and some labor surplus. The year ended, as a whole, on a favorable plane. A distinct feeling of optimism prevails in the Mountain States as the year opens.

Economic Currents of United States to Be Studied

A committee of leading business men and economists whose names will be announced later has been appointed by Secretary Hoover to supervise a far reaching inquiry into the changes in economic currents in the country, according to the Department of Com-Private individuals have submerce. scribed the necessary money to enable the committee to pay the expenses of the Bureau of Economic Research of New York, to make the fact-finding background, and the co-operation of the Department of Commerce will be given.

It is proposed to determine facts with regard to such questions as the shifts in employment, changes in methods of production in industry and agriculture, and in distribution, shifts in relative price levels and profits, movements in the business cycle, shifts in standards of living, foreign trade and foreign credits, and other allied subjects which bear upon an understanding of the general business situa-

Upward Trend in North Central tion of the country. It is expected that the inquiry will take some months and will be made of most exhaustive order.

Resolutions on Outside Exhibits Adopted

The executive committee of the American Electric Railway Association at its meeting held in Cincinnati, Ohio, on Jan. 27 passed the following resolutions in connection with the 47th annual convention and exhibit of the association scheduled for Cleveland, Sept. 22 to inclusive.

RESOLUTION No. 1

Whereas, the executive committee in previous years has passed certain resolutions looking with disfavor upon the practice of certain manufacturers in demonstrating buses and staging exhibits in hotel rooms and other places away from the Exhibit Halls and inviting delegates to their demonstrations and exhibits, and Whereas, in general, the manufacturers have co-operated at recent conventions in abstaining from such practices and thus promoting the success and welfare of the main exhibition of the Association by encouraing delegates to concentrate their study upon said exhibits in the exhibition halls, be it

Resolved: That this executive committee in meeting assembled the 27th day of January, 1928, hereby vote to express its appreciation of the co-operation upon the part of the manufacturers, and to request the continuation of their wholehearted support in this matter.

in this matter.

RESOLUTION No. 2

Whereas, the practice of setting aside one day during the Convention week for the intensive inspection of exhibits by operating members has proved to be a general success during the several previous conventions and

Whereas, many expressions of appreciation and other favorable comment from both railway and manufacturer members has resulted from this practice, be it

Resolved: That the executive committee in meeting assembled this 27th day of January, 1928, again vote to set aside one day, the date to be determined later by the Committee on Convention arrangements, to be devoted exclusively to exhibit inspection, and request that no meetings of any kind be scheduled for that date.

RESOLUTION No. 3

Whereas, the 47th annual convention of the American Electric Railway Association will again be held in the City of Cleveland, in the vicinity of which city there are located the plants of many of our manufacturing members, and

Whereas, it is considered desirable that an opportunity be provided for delegates in attendance at the Convention to visit such manufacturing plants in such a way as not to interfere with attendance at the convention meetings or the exhibits, be it

Resalved: That this executive committee in meeting assembled this 27th day of January, 1928, hereby vote in view of the fact that the convention and exhibit closes at noon on Friday, Sept. 28, 1928, to suggest to all Manufacturer Members, that all inspections of Cleveland plants be definitely set for Friday, Sept. 28, at any time after 12:00 o'clock noon, or on Saturday, Sept. 29, at which time any manufacturers who might desire to hold open house at their plants for such inspection, might do so with the approval of the executive committee.

The Executive Committee approved the budget prepared by the director of exhibits based on a rate of 60 cents per square foot for all inside exhibition space, and \$2.00 per lineal foot for all track space.

Converting Six Passenger Cars into Snow Fighting Units

Conversion of six motor passenger cars of the Gary Railways, Gary, Ind., into snow-fighting units at a total estimated cost of \$25,000 has begun in the company's shops at Gary. Four cars are now being converted into sweepers, with motor-driven brooms, new controllers, salt boxes and sand bins with one-ton capacity each. cars are being equipped as double-end sweepers, similarly fitted and provided with modern wrecking apparatus.

Morton Products Described in De Luxe Catalog

An attractive and handsomely designed general insert catalog has been issued by the Morton Manufacturing Company, Chicago, Ill., descriptive of its line of railway appliances and industrial steel products. The book has a dark green embossed leather covering and contains an index giving the section and page number. Celluloid tabs divide the sections from A to L. In the forward it is stated that "the purpose of this catalog is to present in a clear, concise and comprehensive manner detailed descriptive and pictorial informative data calculated to be of substantial assistance to those persons charged with the decision and intelligent selection of railway and such other supplies, as are displayed on the following pages." The book is replete with illustrations and is arranged in a convenient serviceable manner for ready reference.

Chicago & Joliet to Spend Approximately \$160,000

New equipment and reconstruction work for the Chicago & Joliet Electric Railway, Joliet, Ill., during the current will amount to approximately \$160,000, it is reported. A new substation at Lemont and new tracks on Morgan and Hickory Streets in Joliet are principal items of the budget. No new cars are included in the year's program.

New South Bend Station Ready for Use

Arrangements were made to open on Jan 28 the new station at South Bend, Ind., for South Shore Line passengers.

The South Bend station improvement is an added step in the program of rehabilitation of the South Shore Line begun two years ago by the present management, and reviewed previously in Electric Railway Journal. Up to the first of this year, more than \$5,000,000 had been spent on this railroad to bring it up to the standard of operation now maintained. New steel cars, increased frequency and speed of service, automatic safety block signals of the latest type, complete re-electrification, many miles of new 100 lb. rail and double track, station improvements, new freight equipment and many other extensive changes have been made.

Metal Markets Quiet but Steady

Buying of non-ferrous metals in the week ended Feb. 1 has been small, but prices are little changed from those obtaining last Wednesday in the domestic market. Copper had been dull until Feb. 1 when an incipient buying wave started. A moderate business was done in both lead and zinc, prices for the former tending to weaken as a consequence of material declines in London. The afternoon of Feb. 1 wiredrawing interests entered the copper market rather unexpectedly and bought about 5,000,000 lb. of copper at 14.125 cents, delivered in Connecticut.

Primary producers have continued to stand pat at the 14.125 cents price, Connecticut. Moreover, they have made sales at that figure each day during the week; and business has been done on Jan. 30 and 31 at so-called Middle West points at 14.25 cents and even a little higher. On the other hand, one or two customs smelters have shaded the even eighth by from $2\frac{1}{2}$ to 5 points. Incidentally, two interests that come under this classification have been firm at 14.125 cents. Foreign copper business at 14.50 cents c.i.f. has been fair.

Modest sales of zinc have been made at prices ranging from 5.65 cents to 5.70 cents. An occasional car of High-Grade is sold in New York on the basis of 7.75 cents.

Lead business was fairly good until Jan. 30, when the continued decline in London caused buyers to wonder if a reduction in prices on this side was not in order, so for the last three days the market has been very quiet indeed. The American Smelting & Refining Company continues its contract price at $6\frac{1}{2}$ cents, New York.

Lead has been freely offered in good

tonnages all week at 64 cents, St. Louis.

The tin market continues quiet, with daily sales in the neighborhood of 200 Though prices have declined slightly from those of a week ago, the drop has not been sufficient to stimulate much buying.

The 99 per cent grade is practically out of the market and quotations are only nominal.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

pietais—New Tork	Jan.	31,	1928	ŕ
Copper, electrolytic, cents per lb		16	. 875 . 125 6. 50 . 025 . 625	
Bituminous Coal, f.o.b. Mines				
Smokeless mine run, f.o.b. vessel, Hamp Roade, gross tons. Somerset mine run, Boston, net tons Pittsburgh mine run, Pittsburgh, net to Franklin, Ill., screenings, Chicago, net to Central, Ill., screenings, Chicago, net to Kansas screenings. Kansas Citv. net ton	ne one	i	.70 .50 .125	
Materials				
Rubber-covered wire, N. Y., No. 14, 1,000 ft Weatherproof wire base, N.Y., cents per Cement, Chicago net prices, without bage Linseed oil (5-bbl. lots), N. Y., cents per White lead in oil (100-lb. keg), N. Y.,	r lb.	16 2 10	.30 .75 .05 2	

per lb.... Turpentine (bbl. lots), N. Y., per gal.....

13 25 \$0.65

TRACK AND LINE

VIRGINIA ELECTRIC & POWER COM-PANY, Richmond, Va., on Jan. 29 placed in service a 1-mile, double track extension to its Belmont Avenue line. The extension was constructed at a cost of \$63,000. It will serve the rapidly growing west end residential section of the city. Extending from Westhampton Avenue to Granite St.. the new tracks will furnish additional transportation facilities for one of Richmond's largest parks and athletic fields. Construction is of the most modern type. Mention that the work had started was made in the JOURNAL Nov. 5.

TRADE NOTES

C. E. SMITH & COMPANY, consulting engineers, Railway Exchange Building, St. Louis, Mo., have sent out a card which announces that this consulting engineering business will be continued under the title of C. E. Smith & Com-pany, by men who have been associated with the company for five to twelve years, among them the following: Manager, M. H. Doyne; secretary and treasurer, M. C. Beck; M. H. Doyne, civil engineer; S. B. May, civil engineer; R. M. Boyle, mechanical engineer; B. F. Thomas, Jr., electrical engineer; M. M. Kinsey, civil engineer; F. R. Nohl, civil engineer; R. L. Scattle engineer Saettele, engineer and cartographer, and

O. S. Tyson & Company, Inc., New York, recently announced that W. L. Towne had joined its organization as a vice-president and member of the board of directors. Mr. Towne's experience embraces engineering with the Con-necticut Company and the Ontario Power Company; instructor of steam and electrical engineering, McKinley Manual Training School; assistant technical editor, United States Geographical Survey; engineering and design, American Optical Company; advertising engineer, General Electric Company; advertising manager and assistant sales manager, the Austin Company, and national advertising, in charge of educational advertising for the General Electric Company.

DREW ELECTRIC & MANUFACTURING COMPANY, Cleveland, Ohio, announces that it has sold its business of trolley line material and fittings to the Ohio Brass Company, Mansfield, Ohio.

MERZ & McLELLAN, London, England, wish to make it clear that it is their Newcastle office only that has removed to Carliol House, Newcastle-upon-Tyne. Their London office remains at 32, Victoria Street, Westminster, S.W. 1.

NATIONAL CARBON COMPANY, Inc., carbon sales division, Cleveland, Ohio, announced the opening on Jan. 3 of branch sales offices at the present brush service plants of the company in New

York City, Chicago, Ill., Pittsburgh, Pa., and Birmingham, Ala. The addresses of the new offices are: 357
West 36th Street, New York, N. Y.;
551 West Monroe Street, Chicago, Ill.; Arrott Power Building, No. 3, Barker Place, Pittsburgh, Pa., and 1824 Ninth Avenue North, Birmingham, Ala.

A. H. GRAYBURN, assistant secretary and assistant treasurer of the Norma-Hoffmann Bearings Corporation, Stamford, Conn., has resigned to take an executive position with the Hope Engineering & Supply Company of Mount Vernon, Ohio, and New York City. A. H. Ritter, New York district man-ager, goes to Stamford as assistant secretary, and will be succeeded in New York by F. W. Mesinger from the Stamford office. Norman Bell, assistant sales manager, has also been made assistant secretary. E. C. Lenon at Stamford will be in charge of orders, shipments, credits and collections.

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, announces the transfer of John Van Horne from Atlanta to Moline, Ill., where he will be located at 514½ Fifteenth Street, covering the Tri-Cities, on the sale of its products. He will operate under the direction of R. D. Malin, Western manager at Chicago, Ill.

TIMKEN ROLLER BEARING COMPANY, Canton, Ohio, has authorized the expenditure of \$4,000,000 for the coming year to be devoted to increasing the production facilities of the company. The greater part of this expansion program concerns the company's plant at Canton, where both the steel mill and the bearing manufacturing plant proper will be considerably enlarged. Among other features a new substation will be built for supplying electric power for both the steel mill and the factory.

ADVERTISING LITERATURE

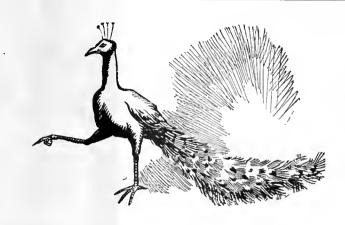
MONITOR CONTROLLER COMPANY, Baltimore, Md., has recently issued bulletin 111, with illustrations and descriptions of its resistors.

TIMKEN ROLLER BEARING COMPANY, Canton, Ohio, has issued a booklet "The Truth About Anti-Friction Bearings," in which the design, function, necessity and performance of such bearings are discussed.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y., has recently issued a booklet "The Application of Electric Drive to Motor Buses." The booklet is illustrated with pictures and charts.

MARTINDALE ELECTRIC COMPANY, Cleveland, Ohio, announces a four-page folder, illustrating and describing three types of portable blowers. The company states that the folder will be mailed on request.

SCHWEITZER & CONRAD, INC., Chicago, Ill., has issued an illustrated 20page looseleaf bulletin descriptive of its "S and C" high potential fuse. Inseparably linked with unfailing dependability



THE field properly interprets the term "emergency brakes" as meaning an agency to halt a car when all other methods of bringing it under control have failed.

"Peacock" Staffless is inseparably associated with "Emergency brakes." The final emergency is prepared for with a "Peacock" Staffless Brake. Its power, speed, simplicity and capacity grouped under the paramount quality of unfailing dependability are universally recognized — and utilized.

We will be glad to send you complete details.



The Peacock Staffless

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Canada

Firestone LEADERSHIP



Saves Millions for Truck and Bus Operators

In twenty-eight years of specialization in tire manufacture, Firestone has built up the world's greatest exclusive tire organization—with direct control of raw material supplies, eliminating middlemen's profits—and with the world's largest and best equipped tire fabric mills and mammoth tire and tube plants equipped throughout with special Firestone-designed, cost-saving machines.

Firestone pioneered in the development of motor truck and bus transportation, by providing heavy duty Gum-Dipped Pneumatic tires that are cutting operating cost for hundreds of leading fleets, and thousands of individual operators, throughout the country.

It will pay you to investigate the Firestone tire service plan which includes not only the right tire for the work, but also the right service after application—particularly planned and carried out to insure for each operator all the extra miles built in to Firestone Tires in the world's most modern tire and tube factories. Talk it over with the Firestone Dealer, or write the nearest Factory Branch or the home office, at Akron, for complete information.

MOST MILES PER DOLLAR

AMERICANS SHOULD PRODUCE THEIR OWN RUBBER. . Farmey Surveytone

Long Equipped GMC Truck Makes Record Run

In 103 hours and 59 minutes, the GMC two-ton truck, with Cannon-Ball Baker at the wheel, carried its capacity load from the Atlantic to the Pacific. The Long Radiator for 3,693 miles of gruelling speed answered every demand. Over mountains and deserts, through rough dirt road detours—for the entire run—the dependable Long Radiator kept the engine at the proper temperature for maximum efficiency.

LONG MANUFACTURING CO.
DETROIT . MICHIGAN



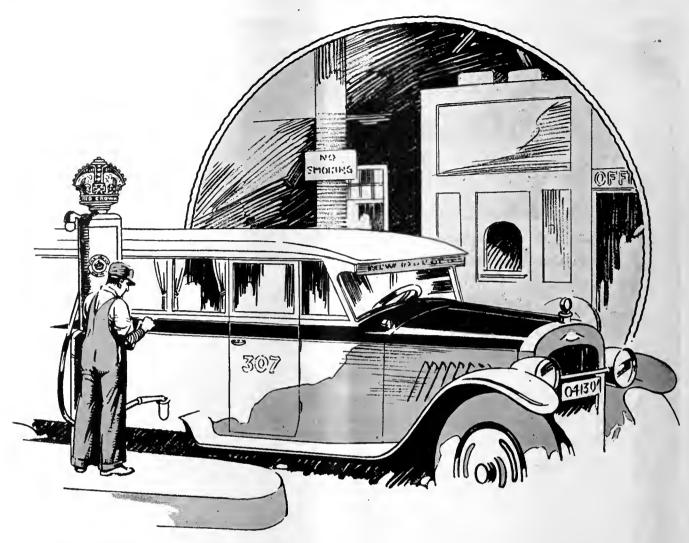


LONG PRODUCTS
Automotive Clutches
and Radiators

ONG

The truck, with Long Radiator. Cannon-Ball Baker at the wheel.





Do Your Buses Come in On Time!

Maintaining schedules during the winter months becomes a problem for all operators of Motor Bus fleets. Cold weather, slippery highways, snow-drifted roads and other obstacles all work to delay the movements of the passenger bus. Such conditions cannot be overcome. But you can insure the perfect operation of the monster "power plants" in your equipment by using, at all times

Red Crown Gasoline

This superior motor fuel enables the bus engine to do its best, regardless of weather or road conditions.

Red Crown Gasoline starts the engine quickly, allows it to accelerate smoothly—rapidly. And because every drop of this famous fuel is converted into a steady stream of power, the engine "digs down" and pulls for all it's worth. Tremendous pulling power is absolutely essential to

overcome the handicaps of winter driving.

We should like to demonstrate the superiority of this dependable, quality proved gasoline in one or all of your buses. An expert, at your request, will conduct the test at no cost or obligation to you. Just phone or write our nearest branch office. We will send a man to prove that Red Crown Gasoline will help bring your buses in on time through the snow, sleet and cold of winter.

STANDARD OIL COMPANY

(INDIANA)

General Offices: 910 S. Michigan Ave., Chicago, Illinois

101 YEARS OF MANUFACTURING EXPERIENCE



No. 327 C

Snow sweeper rattan and rattan car seat webbing may be ordered through any H-W sales office.

For New Cars or Replacement Use

Here is a good-looking, long-wearing, reversible seat that will help you reduce the equipment cost for new cars or for replacement improvements. The 327 C is fairly inexpensive, yet it embodies all the mechanical betterments of our higher priced seats. This modern style has a soft, comfortable spring back and a deep, single-spring, six-inch cushion. The reversing mechanism, made of malleable iron to withstand hard service, is positive and easy in action.

If you are interested in keeping equipment costs down to a minimum, here is a seat that you will appreciate. A note to the nearest representative, listed below, will bring an experienced man who will be glad to furnish complete details and specifications on the 327 C.

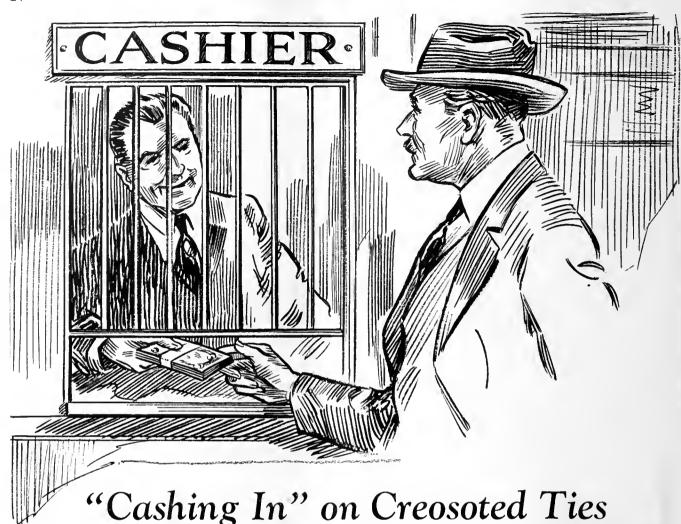
If you have not received a copy of our new Bus Seat Catalogue, write for it.



Heywood-Wakefield

Heywood-Wakefield Co., Wakefield, Mass.; 516 West 34th St., New York, N. Y.;
439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San
Francisco, Cal. The G. F. Cotter Supply Co., Houston, Texas. F. N. Grigg,
630 Louisiana Ave., Washington, D. C. The Railway & Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal;

Winnipeg, Canada.



You are always sure to "cash in" on creosoted ties. Just as certain as cashing the coupons on gilt edge investment issues. There is no element of uncertainty as to their long life, durability and fitness for electric traction service. The additional cost for creosoting pays for itself many times over.

Creosoted ties have been time tested and they have demonstrated economical service in both open and closed track. Under heavy steam railway traffic they are rendering over twenty years of service. Some roads have cut their tie renewals in half. *International* has ties in service on the New Orleans-Carrolton Street Railway for over 25 years and their condition

indicates they are good for many more years. During a street improvement program in New Orleans, creosoted ties which were in service 14 years were torn up. Their condition was so good that the ties were used again in the new track construction.

A recent investigation shows that 24 prominent electric railways, long users of creosoted ties, report large tie savings, and that treated ties proved economical and satisfactory in every detail.

International Ties are manufactured from sound timber—hewed to full size—properly seasoned and treated. Strong ties which will stand up in service are thus assured.

International Creosoting and Construction Co.

General Office—Galveston, Texas

Plants: Texarkana—Beaumont—Galveston

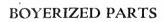
International High Grade Creosoted Ties



that Boyerized Car Parts have a "Gibraltar" ability to withstand the attacks of old man "Wear and Tear," and to withstand such attack far longer than any ordinary car parts? Nevertheless it's a fact, for the experience of all users shows them to stand up under the most severe service strains three or four times longer than ordinary steel parts.

The Boyerizing Process gives them an armor plate surface that enables them to do it.

Boyerized Parts are the Gibraltars of electric railway car equipment. Choose your parts from the following list and give them a test trial. Then you, too, will know!



Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings

Spring Posts
Bolster and Transom Chafing
Plates
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings

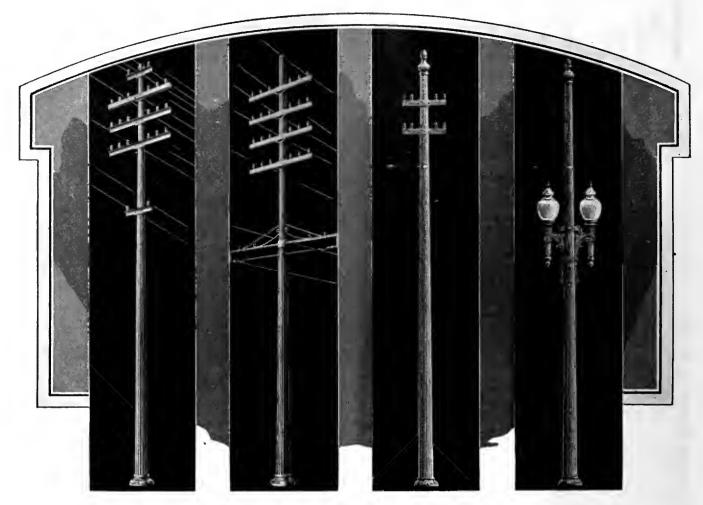
Bemis Car Truck Company

Electric Railway Supplies Springfield, Mass.

REPRESENTATIVES:

F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. W. F. McKenney, 54 First Street, Portland, Ore. J. H. Denton, 1328 Broadway, New York City, N. Y. A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.





Beauty is Coupled with Strength in UNION METAL POLES

BEAUTY in transmission and distribution poles was a neglected factor until Union Metal Fluted Steel Poles were placed on the market. Their fluted construction and ornamental base together with the perfect alignment possible, gives them a stately appearance which is a pleasing contrast to the old-style, unsightly wooden poles leaning at all angles.

In addition to the advantage of artistic design, Union Metal poles combine greater strength and a low center of gravity with lighter weight and economy of installation. Erection is simplified by means of the Union Metal anchor rod construction. Poles are set in place on a concrete foundation and secured by heavy anchor bolts. Line crews can erect the poles and apply the

loads in one continuous operation, thus effecting a considerable saving of both time and money.

The fact that the same pole can be used to support the trolley span wire and carry transmission and distribution lines reduces the number of poles along the curb line. This double-duty plan, together with the attractiveness of Union Metal poles, successfully combats the agitation for underground wires and builds good will for street railway companies and central stations, alike.

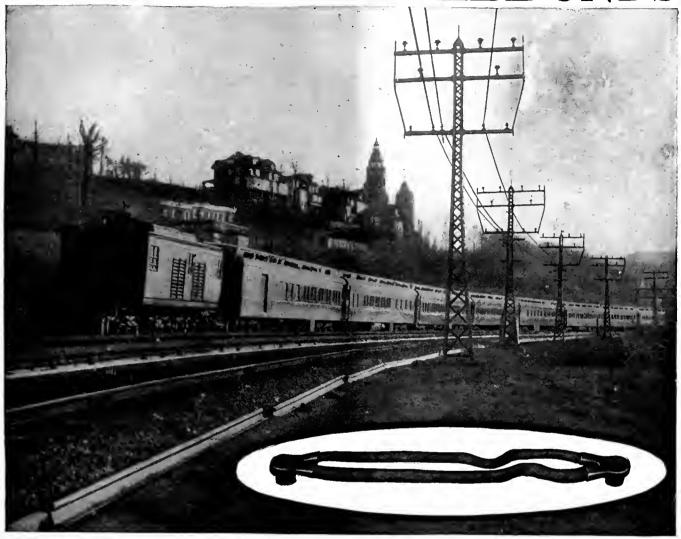
Union Metal poles can be adapted to any local requirement. Write for further information about this new achievement and see how Union Metal Fluted Steel Poles will answer your individual demands.

THE UNION METAL MANUFACTURING COMPANY

General Offices and Factory, Canton, Ohio Branches—New York, Chicago, Philadelphia, Cleveland, Pittsburgh, St. Louis, Los Angeles, San Francisco, Jacksonville.

UNION METAL DISTRIBUTION AND TRANSMISSION POLES

PIN TERMINAL RAIL BONDS



View of 20th Century rounding bend at Marblehead. The New York Central is always among the leaders in modern equipment. Insert shows our type CPO1 Bond used on all main line tracks

BECAUSE of the ease of installation, Pin Terminal Rail Bonds are used on many of the larger railway systems. They are accessible for inspection, show low maintenance cost, insure strong contact and low resistance.

The American Steel and Wire Company has a rail bond for every requirement. Our engineers will be glad to assist you in selecting the best bond for your needs.

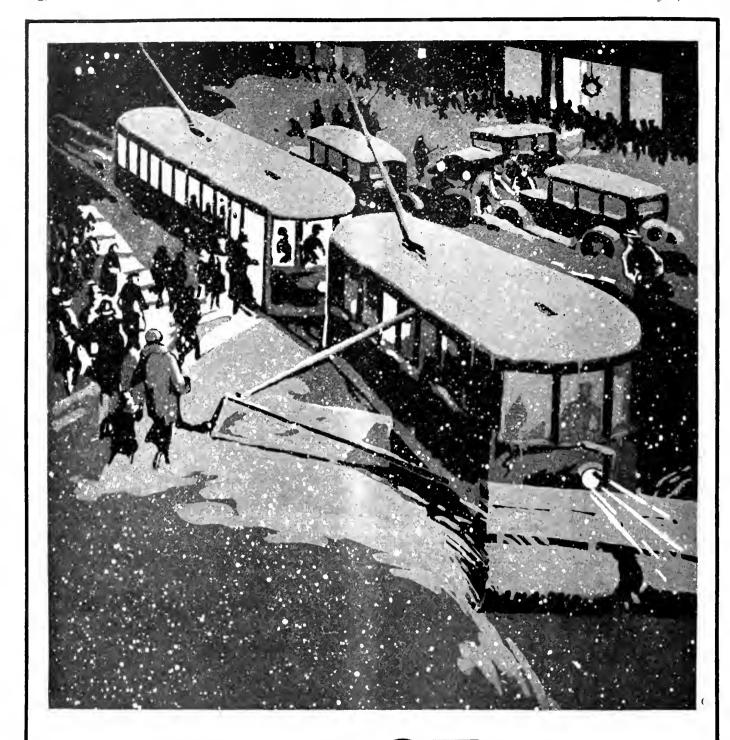
American Steel & Wire

Sales Offices:

Company

CHICAGO, NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADELPHIA, PITTSBURGH, BUFFALO, DETROIT, CINCINNATI, BALTIMOBE, WILKES-BARRE, ST. LOUIS, KANSAS CITY, MINNEAPOLIS-ST. PAUL, OKLAHOMA CITY, BIRMINGHAM, MEMPHIS, DALLAS, ATLANTA, DENVER, SALT LAKE CITY EXPORT REPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK

PACIFIC COAST REPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LOS ANGELES, PORTLAND. SEATTLE



SERVICE.. yesterday-today-tomorrow

Barron G. Collier Inc.

Candler Bldg.

New York



service

SALES OFFICES

332 So. Michigan Ave. Chicago 350 Madison Ave. New York City 401 W. Main St. Louisville, Ky. Brunswick, Ga. Bogalusa, La. BROKEN pole in an important transmission line means interruption to service that cannot be tolerated. In order to protect such a line from failure even under the occasional abnormal load the factor of safety must not only be ample for the new pole. It must be maintained. Creosoted southern yellow pine is the only pole timber that meets these requirements with any reasonable economy. The strength of a new Amcreco pole is unsurpassed by any other wooden pole and this strength remains constant because there is no deterioration from decay or other causes.

You will pay less per year of service for Amcreco poles.

AMERICAN CREOSOTING COMPANY

GOLONIAL
GREOSOTING
GOMPANY
HISPAPPRATED



GEORGIA
GREOSOTING
GOMPANY



US 20A base with Timken Bearings

Ever Grease a Trolley Base?

If you have every greased one of the older types, you will appreciate the lubrication features of the US 20A trolley base. The base contains reservoirs which require filling but once every six months and then all that is necessary is to remove a pipe plug and replenish the lubricant. The lubrication of the working parts of the US 20A is positive and reliable at all times.

The lubricant is securely held in an upright metal cup from which it is impossible for it to leak out and deface the car roof. This is accomplished without the use of leather gaskets or other makeshift arrangements.

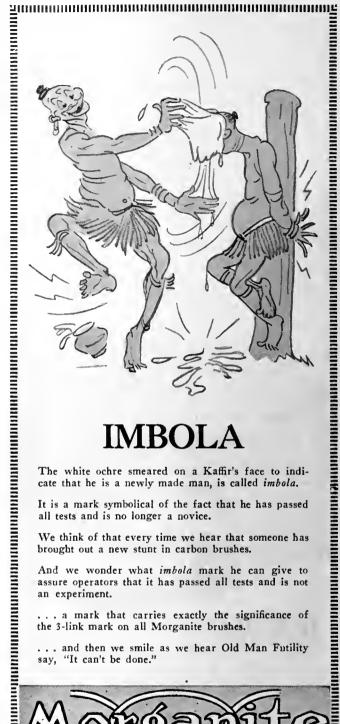
> Send for bulletin No. 46.

R.D.NUTTALL COMPANY

All Westinghouse Electric & Mig. Co. district offices are sales representatives for Nuttall Railway Products.

Canadian Agent: Lyman Tube & Supply Co., Montreal, Toronto, Canada





The white ochre smeared on a Kaffir's face to indicate that he is a newly made man, is called imbola.

It is a mark symbolical of the fact that he has passed all tests and is no longer a novice.

We think of that every time we hear that someone has brought out a new stunt in carbon brushes.

And we wonder what imbola mark he can give to assure operators that it has passed all tests and is not an experiment.

. a mark that carries exactly the significance of the 3-link mark on all Morganite brushes.

. . . and then we smile as we hear Old Man Futility say, "It can't be done."

Main Office and Factory

3302-3320 Anable Ave., Long Island City, N. Y.

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile
Library Building
Cleveland, Electrical Engineering & Mfg. Co., 320 Union Building.
Baltimore, O. T. Hall, Sales Engineer, 432 North Calvert St.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Las Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Taranto, Can., Railway & Power Engineering Corp., Ltd., 101
Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 68-70
St. Antoine St.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O.
Box 325.





COLUMBIA

Railway Supplies and Equipment

Machine and Sheet Metal Work

Forgings Special Machinery and Patterns

Grey Iron and Brass Castings

Armature and Field Coils.

The Columbia Machine Works and M. I. Co.

265 Chestnut St., corner Atlantic Ave., Brooklyn, New York

Keep regular, systematic, infallible check of car movements at time points along the line with NACHOD Headway Recorders—positive, tamperproof, simple and rugged.

MARK TIME!



N-A-C-H-O-D

Headway Recorders

The cars themselves mark their time on the chart of the NACHOD Automatic Headway Recorder-a record of operation for the superintendent, easy to read and file for reference. The chart shows how late or early the car is according to schedule. The Recorder points out irregularities and "slack" in the schedule. An efficient tool for the careful manager.

AUTOMATIC BLOCK SIGNALS

NACHOD and UNITED STATES types to meet every operating requirement. We will gladly submit recommendations for complete systems covering large or

Catologs on request

Nachod & United States Signal Co., Inc. 4777 Louisville Avenue, Louisville, Ky.

English Representative: Forest City Electric Co., Ltd., Manchester, Eug.



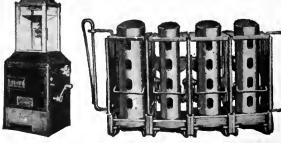
JOHNSON FARE COLLECTING **SYSTEMS**



Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 11 to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.



Johnson Fare Box Co.

4619 Ravsnswood Ave., Chicago, Ill.

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Least Maintenance

Lightest Weight Greatest Adaptability

Catalog complete with engineering data sent on request

ELECTRIC RAILWAY EOUIPMENT CO. CINCINNATI, OHIO

New York City, 30 Church Street

B. A HEGEMAN, Jr. President F. T. SARGENT, Secretary

H. A. HEGEMAN, First Vice-Pres. and Tress. J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co.

Graybar Building, 420 Lexiogton Ave., New York BRANCH OFFICES

Munsey Bldg., Wasbington, D. C. 100 Boylston St., Boeton, Mass. Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions Anglo-American Varnishes, Ensamele, etc. National Hand Holds Genesco Paint Olle Dunham Hopper Door Device Garland Ventilators Welter Tractor Snow Plows Feesible Drop Brake Staffs Ft. Pitt Spring & Mfs. Co.. Springs

Flaxilinum Insulation
Economy Electric Devices Co.
Power Saving and Inspection
Meters Meters
National Safety Devices Company's Whistle Blowers,
Gong Ringers and Brake
Hangers
Godward Gas Generators
Cowdry Automotive Brake
Testing Machine

PANTASOTE

the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

-the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

> Standard for electric railway cars and motor buses



Samples and full information gladly furnished.



The PANTASOTE COMPANY, Inc. 250 Park Avenue, **NEW YORK**



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl Free-Winding Tension Spring Ratchet Wind Emergency Release Perfect Automatic Lubrication

Earll Catchers and Retrievers C. I. EARLL, York, Pa.

Conadian Agenta: Rallway & Power Engineering Corp., Ltd., Toronto, Ont. In All Other Poreign Countries: International General Electric Co., Schenectady, N. Y.

Right on your desk -just the data you want

Electric railway executives, engineers and operating men have long respected Richey's ELECTRIC RAIL-WAY HANDBOOK as the one great pocketbook of practice data, formulas and tables in the electric railway field.

The second edition of Richey covers the latest developments-describes new methods-records changes in theory and practice. It covers every phase of electric railway work from Roadbed and Track to Signals and Communication.



This widely known handbook is virtually an encyclopedia, on modern electric railway organization, administration and operation.

- Data on subjects which come up in everyday electric railway practice for constant use by the operating, constructing and designing engineer.
 Material of service to the non-technical manager or operator.
 Reference material on electric railway practice for those who are specializing in other or allied fields.

Information every electric railway man needs—the latest and best methods—changes in practice and theory—that's the New Richey.

See your copy FREE Mail just this coupon

McGRAW = HILL **EXAMINATION COUPOR**

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York, N. Y.
You may send me on 10 days' approval Richey's Electric Railwa Handbook, \$4.00 nct. I agree to pay for the book or return i postpaid within 10 days of receipt.
Signed

Official Position

Name of Company..... (Books sent on approval to retail purchasers in the U.S. and Canada only.)

Bankers & Engineers

Ford, Bacon & Pavis

Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER

Incorporated

Design and Construction
Examinations Reports Appraisals
Industrial and Public Service Properties

NEW YORK

BOSTON

CHICAGO

SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design

Construction
Examinations Report

uction Msnagement Reports Valuations

CHICAGO

NEW YORK

SAN FRANCISCO

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

A. L. DRUM & COMPANY

Consulting and Constructing Engineers

VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF
ELECTRIC RAILWAYS

230 South Clark Street, Chicago, Ill.

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS
120 BROADWAY, NEW YORK

ENGINEERING CONSTRUCTION YOUNGSTOWN, O. CHICAGO, ILL.

FINANCING MANAGEMENT

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells APPRAISALS Albert W. Hemphill

INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

E. H. FAILE & CO.

Designers of

Garages-- Service Buildings-Terminals

441 LEXINGTON AVE.

NEW YORK

The J. G. White Engineering Corporation

Engineers-Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys
Better Service—Financial Reports
Appraisals—Management

35.751..

52 Vanderbilt Ave.

New York

Byllesby Engineering & Management Corporation

231 S. La Salle Street, Chicago

New York

San Francisco

ENGELHARDT W. HOLST

Consulting Engineers

Appraisals Reports Rates Service Investigation
Studies on Financial and Physical Rehabilitation
Reorganisation Operation Management

683 Atlantic Ave., BOSTON, MASS.

DAY & ZIMMERMANN, INC.

ENGINEERS

Design - Construction - Reports
Valuations - Management

NEW YORK

PHILADELPHIA

CHICAGO

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass—Differential Fares—Ride Selling

Holbrook Hall 5-W-3

160 Gramatan Ave., Mt. Vernon, N. Y.

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W. Washington Street, Chicago, Ill.

MCCLELLAN & JUNKERSFELD

Incorporated ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations
Transportation Problems—Power Developments
68 Trinity Place, New York

Chicago

St. Louis

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES
ATLANTA, Candler Bullding
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CINGINNATI, Traction Bullding
CLEVELAND, Guardian Bullding
DALLAS, TEXAS, Magnolla Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Bullding
HOUSTON, TEXAS, Electric Bullding
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street



Bayonne, N. J. Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHORNIX, ARIZ., Heard Building
PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE., Falling Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, ROYAL BANK Building

.

C. B. BUCHANAN

W. H. PRICE, JR. Sec'y-Treas,

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction Financial Reports, Traffic Surveys
and Equipment Maintenance
BALTIMORE
Phone:

1604 Citizens National Bank Bldg.

Phone: Hanover: 2142

NEW YORK 49 Wall Street

THE P. EDWARD WISH SERVICE

5) Church St. NEW YORK

Street Railway Inspection DETECTIVES

131 State St. BOSTON

CAR COMFORT WITH

HEATERS REGULATORS **VENTILATORS**

2241-2247 Indiana St. Chicago, Ill.

Write for

1328 Breadway New York, N. Y.

ILLINOIS MOTIVE **EQUIPMENT COMPANY**

J. D. Elsom, President

General Sales Agent—The Air Rectifier
District Representatives
Johnson Fare Box: McCloskey Bomb Shell Torch;
Clach Vertical Swipe; Fyr-Fly Spot Light

35 E. Wacker Drive

Chicago, Illinois

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment The Universal Lubricating Co.

Cleveland, Ohio Chicago Representatives: Jameson-Rose Company. Straus Bldg.



Car Heating and Ventilating

—are no longer operating problems. We can show you how to take care of both with one equipment. The Peter Smith Forced Ventilation Hot Air Hester will save, in addition, 46% to 50% of the cost of any other ear heating and ventilating system. Write for details.

The Peter Smith Heater Company 6209 Hamilton Ave., Detroit, Mich.

JANA 1818 1-719 17 AD 2000 AT (711 7 FB 12 AD) FEET 1-10 AD A TOUR AT PART FOR SECURIOR STRATE



......

RAIL JOINTS

DYNAMOTORS WELDING ROD

UNA Welding & Bonding Co. Cleveland, Ohio.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Perey Manufacturing Co., Inc. 101 Park Avenue, New York Otty



General Offices and Plants EAST CHICAGO, INDIANA, U.S. A.



THE WORLD'S STANDARD

"IRVINGTON"

Black Varnished Cambric. Varnished Silk.

hertingen material in the companies of t

Yellow Varnished Paper

Irv-O-Slot Insulation

Flexible Varnished Tubing Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co. Irvington, N. J.

Sales Representatives:

Mitchell-Rand Mfg. Co., N. Y.
E. M. Wolcott, Rochester
I. W. Levine, Montreal
A. L. Gillies, Toronto
Consumers' Rubber Co., Cleveland

ELECTRICAL INSULATION



Micanite and Super-Micanite Sheets, Commutator Segments, and Commutator Rings

Micanite Tubes and Washers

Linotape, Seamless or Sewn Bias (Yellow or Black Varnished Tapes)

Empire Oiled Cloths and Papers (Yellow or Black)

Compounds, Varnishes, Etc.

Send for catalog and helpful booklet on Commutator
Insulation and Assembly

MICA INSULATOR COMPANY

Largest manufacturers in the world of mica insulation. Retablished 1888

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Cleveland

Pittsburgh Cincinnati
Torouto Los Angeles Seattle

Works: Schenectady, New York. London, England

Used and Surplus Equipment

NDIVIDUAL items of used equipment, or surplus new equipment, or complete plants, are disposed of (and found) through advertising in the Searchlight Section of this paper.

This is the section which so effectively aided the Government in selling the many millions of dollars worth of surplus material and equipment secumulated during the war without disturbing the

SEARCHLIGH

Bethlehem Products for Electric Railways

Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Frogs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Base Plates; Rolled Steel Wheels and Forged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

SPECIAL TRACKWORK of the famous TISCO MANGANESE STEEL

WM. WHARTON JR. & CO., INC. EASTON, PA.

Chicago El Paso Montreal New York Philadelphia Pitteburgh San Francisco

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa. Sales Offices:

Chicego Philedelphia

Cleveland Pittaburgh

New York Dallas

Pacific Coast Representation: Usited States Steel Products Company Portland San Francisco

Expert Representative:
United States Steel Products Company, New York, N. Y.

Kalamazoo Trolley Wheels

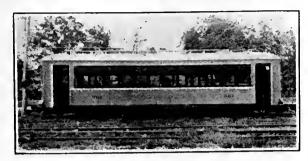
The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.

SEARCHLIGHT SECTION

TWENTY BIRNEY TYPE CARS



Available for Immediate Delivery

All steel, double truck, light weight, equipped for one or two man operation with all known safety devices. Attractively priced!

- WANTED TO BUY -

15 to 20 all steel or semi-steel cars. Weight 50,000 to 60,000 lbs. Length about 50 ft. Must be modero design, with or without electrical equipment. Send full particulars and price.

The IRVING S. VAN LOAN CORP.

1819 Broadway, New York City

Telephone: Columbus 4278

FOR SALE

RELAYING RAILS

350 ton, No. 1 70-lb. A.S.C.E., in 60-ft, lengths, Complete with continuous joints.

Clinton Street Raliway Co. Clinton, Iowa

FOR SALE Rotary Converter and Transformers

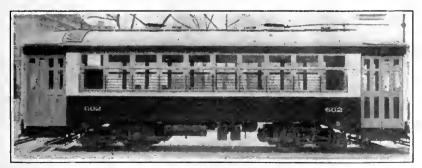
Type T.C., Class 6-150-1200, Form P, Speed 1200. Continuous Current. Amperes 261, Volts 575, A.C., Cycles 60, General Electric Company.

SUSQUEHANNA TRACTION CO.

Lock Haven, Pa.



Another EXCEPTIONAL CAR OFFER!



ST. LOUIS ONE-MAN CARS 2 ALL STEEL, LIGHT WEIGHT AT Unusually Low Prices!

Weight 3400 lbs. equipped. Strictly modern in every respect. Ready for immediate delivery in virtually new condition. Regardless of the fact that they are priced unusually low, we will extend reasonable terms to responsible parties.

Send us your inquiries for anything in Railway equipment—Johnson Fare Boxes, snow fighting equipment, electric locomotives, cars, trucks, motors and parts.

See our other CAR OFFERING in last week's issue!

G. T. ABEL, Specializing in Used Railway Equipment Telephone: Longacre 7372-73 393-7th Ave., New York City

POSITIONS VACANT

FOREMAN and assistant foreman wanted for car house located in New York City; state full particulars and salary expected. P-79, Electric Railway Journal, Tenth Ave. at 36th St., New York.

POSITIONS WANTED

ENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Rallway Journal, Tenth Ave. at 36th St., New York. GENERAL

MASTER MECHANIC of character and ability, 20 years' practical experience on city and interurban property, desires to make a change for personal reasons. Best of references; correspondence solicited. PW-83, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

SHOP FOREMAN, A-1 on city and Interurban equipment, 2I years' successful experience, can handle men and get results. Correspondence solicited. PW-84, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

SUPERINTENDENT transportation; available in near future; qualified by wide experience; a proven successful record, city and interurban railways and coordination rail and bus service; recognized ability in dealing successfully with labor and public and all transportation problems; qualified by experience and ability to successfully fill position of superintendent or assistant manager; correspondence invited; high grade references. PW-82, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

FOR SALE

15 BIRNEY SAFETY CARS Brill Bullt

West, 508 or G. E. 264 Motors Cars Complete—Low Price—Fine Condition ELECTRIC EQUIPMENT CO.

Commonwealth Bldg., Philadelphia. Pa.

A COMPLETE POWER HOUSE EQUIPMENT

- 250 hp. B. & W., and 4-354 bp. Sterling Boilers with Murphy furnaces

- 12—250 hp. B. & W., and 4—354 bp.
 Sterling Boilers with Murphy furnaces and stokers.
 6—750 hp. Hoppe Live Steam Puriflers.
 1—2,000 hp. 28x52 Allis-Chalmers Tandem Compound Condensing Engines.
 1—2,500 hp. 32x68 Allis-Chalmers Tandem Compound Condensing Engine.
 2—1,000 kw., 575 v. General Elec. D.C.
 Railway Generators.
 2—1,000 kw., 575 v. Westinghouse D.C.
 Railway Generators.
 1—1,500 kw., 625 v. Westinghouse D.C.
 Railway Generators.
 1—1,500 kw., 625 v. Westinghouse D.C.
 Railway Generators.
 1—1,500 kw., 625 v. Westinghouse D.C.
 Railway Generator.
 1—14x22x15 Worthington Duplex Air
 Pumps and Condensers.
 1—26-in. Temlinson Burometric Condenser with 6x6-ft. Het Well.
 1—10-in. Lawrence Steam Driven Centrifugal Pump with vertical engine 8x9.
 2—Worthington Compound Boiler Feed Pumps, 10x16x8½x10.
 1—Worthington Compound Fire Steam Pump, 12x17x9½x15.
 1—Worthington Compound Fire Steam Pump, 10x5x10.
 1—Davidson Simplex Pump, 0x3½x6.
 1—350 kw. Westinghouse 350 v. D.C.
 Generator, series wound, 420 r.p.m.
 direct connected to 1—520 hp. West.
 550 v. D.C. sbunt wound Motor.
 1—Brown Holeting Co. Crane, 60 ft. span,
 25 ton, hand operated.
 1—Link Chain Bueket Conveyor, motor driven type.
 Also all miscellaneous, as plping, oil pumps, filters, compressor, steel stack and breeching coal

1—Link Chain Bucket Conveyor, motor driven type.

Also all miscellaneous, as piping, oil pumps, filters, compressor, steel stack and breeching, coal and ash bunkers. All equipment on foundations and in operating condition. Will sell as a whole or in part.

CITY OF DETROIT Department of Street Railways G. W. WAGNER, Supervisor of Purchases Advertising, Sireet Car Collier, Inc., Barron G.

Air Brakes General Electric Co. Westinghouse Air Brake Co.

Anchors, Gny
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armainre Shop Tools Columbia Machine Works Elec. Service Supplies Co.

Automatic Return Switch Stands Ramapo Ajax Corp.

Automatic Safety Switch Stands Ramapo Ajax Corp.

Axles

Bemis Car Truck Co.

Bethlehem Steel Co.

Brill Co., The J. G.

Cincinnati Car Co.

Standard Steel Works Co.

Taylor Electric Truck Cn.

Westinghouse E. & M. Co.

Axles (Front & Rear) Mote Truck & Passenger Car Timken-Detroit Axle Co.

Axles, Trailer & Moinr Bus Timken-Detroit Axle Co.

Babbliting Devices Columbia Machine Works

Budges and Butions
Elec. Service Supplies Co.
International Register Co.

Butterles, Dry Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.,
Cincinnati Car Co.
Columbia Machine Works
Taylor Electric Truck Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side Columbia Machine Works Stucki Co., A.

Bells and Buzzers
Consolidated Car Heating
Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnsti Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

Benders, Ball Rallway Track-work Co.

Bodles, Bus Brill Co., The J. G. Cummings Car & Ceach Co. Graham Brothers

Body Material, Haskelite and Plymeti Haskelite Mfg. Corp.

Boiler Tubes National Tube Co.

Bollers Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus Amer. Steel & Wire Co. Elec. Service Supplies Co. Ohio Brass Co. Railway Track-work Co. Una Welding & Bonding Co.

Bonds, Rall
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohlo Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Taylor Electric Truck Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, etc.)
Bates Expanded Steel Trues

Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Brake Shoes
American Brake Shoe &
Foundry Co,
Bemls Car Truck Co.
Brill Co., The J. G.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe

Brakes, Brake Systems and
Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

Brakes, Magnetic Ball Cincinnati Car Co.

Brushes, Carbon General Electric Co. Morganite Brush Co., Inc. Weetinghouse E. & M. Co.

Brushes, Graphite Morganite Brush Co., Inc.

Brnshholders Columbia Machine Works General Electric Co.

Bulkhends Haskelite Mfg. Corp.

Cummings Car & Coach Co. General Electric Co.

Bushings, Case Hardened & Bushings, Case Hardened & Manganese Brill Co., The J. G. Bemis Car Truck Co. Cincinnati Car Co. Columbia Machine Works

Cables. (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish General Electric Co. Irvington Varnish & Ins. Co. Mica Insulator Co.

Curbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches Consolidated Car Heat. Co. Westinghouse E. & M. Co.

Car Steps, Safety Cincinnati Car Co.

Car Wheels, Rolled Steel Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.,
Luc.

Cars, Gas-Electric Brill Co., The J. G. General Electric Co. Westinghouse E. & M. Co.

Cars, Gas, Rail Brill Co., The J. G.

Cars, Passenger, Freight,
Express, etc.
Amer. Car Co.
Brill Co. The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Kubiman Car Co., G. C.
Wason Mfg. Co.

Cars, Second Hand Electric Equipment Co.

Cars, Self-Propelled Brill Co., The J. G.

Castings, Brass Composition or Copper Cincinnati Car Co. Columbia Machine Works

Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works Co.

Castings, Malleable & Brass Bemis Car Truck Co. Columbia Machine Works

Catchers and Retrievers, Trolley Earll, C. F. Elec. Service Supplies Co. Ohio Brass Co.

Celling Car Haskelite Mfg. Corp. Pantasote Co., Inc.

Cellings, Plywood, Panels Haskelite Mig. Corp.

Chairs, Parlor Car Heywood Wakefield Co.

Change Carriers
Cleveland Fare Box Cn.
Electric Service Supplies Co.

Change Trays Cincinnati Car Co.

Circuit-Breakers General Electric Co. Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables Columbia Machine Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. Hubhard & Co. Ohio Brass Co. Westinghouse E. & M: Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms) Brill Co., The J. G. Cincinnati Car Co.

Clutches Long Mfg. Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coll Banding and Winding Machines
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armsture and Field Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Colls, Choke and Kicking Elec, Service Supplies Co. General Electric Co. Westinghouse E. & M. Co.

Coln Counting Machines Cleveland Fare Box Co. International Register Co. Johnson Fare Box Co.

Cnin Changers
Ill Motive Equipment Co.
Johnson Fare Box Co.

Celn Sorting Machines Cleveland Fare Box Co. Johnson Fare Box Co.

Coin Wrappers Cleveland Fare Box Co.

Commutator Slotters Columbia Machine Works Elec. Service Supplies Co. Westinghouse E. & M. Co.

Commutators or Farts Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Compressors, Air General Electric Co. Westinghouse Tr. Br. Co.

Condensers Westinghouse E. & M. Co.

Condensor Papers Irvington Varnish & Inc. Co.

Connectors, Solderless Westinghouse E. & M. Co.

Connectors, Trailer Car Columbis Machine Works Consolidated Car Heat. Co. Elec. Service Supplies Co. Ghio Brase Co.

Controllers or Parts Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co. Controlling Systems General Electric Co. Westinghouse E. & M. Co.

Converters, Botary General Electric Co. Westinghouse E. & M. Co.

Copper Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining
Co.

Copper Wire Instruments,
Measuring, Testing and
Recording
American Brass Jo., The
American Steel & Wire Co.
Anaconda Copper Mining
Co.

Cord, Bell, Trolley, Register, ord, peu, stone, etc.
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., John A. Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works

Complers, Car
Brill Co., The J. G.
Cinchnatt Car Co.
Ohlo Brass Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators Nichols-Lintern Co.

Cranes, Hoists and Lifts Buda Co., The Electric Service Supplies Co.

Cross Arms (See Brackets)

Crossings Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Crossing Foundations
International Steel Tie Co.

Crossings, Frog and Switch Ramapo Ajax Corp. Wm. Wharton, Jr. & Co. Crossings, Manganese Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Crossing Signals. (See Signal Systems, Highway Cross-ing)

Crossings, Track (See Track, Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures Brill Co., The J. G. Pantasote Co., Inc.

Cutting Apparatus General Electric co. Railway Track Work Co.

Dealer's Machinery & Second Hand Equipment Abel, G. T. Elec. Equipment Co. Hyman Michaels Co. Van Loan Corp., Irving S.

Derailing Switches Ramapo Ajax Corp.

Destination Signs Columbia Machine Works Elec. Service Supplies Co.

Detective Service Wish Service, Edward P.

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heat. Co.
National Pneumatic Co.

Doors and Door Fixtures Brill Co., The J. G. Cincinnati Car Co. Hale-Kilburn Co.

Deers, Folding Vestibule National Pneumatic Co.

Drills, Track Amer. Steel & Wire Co. Elec. Service Supplies Co. Ghio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders Railway Track-work Co.

Electric Rivet Heaters American Car & Foundry Co.

Electrical Wires and Cables Amer. Electrical Works Amer. Steel & Wire Co. John A. Roebling's Sons Co.

Electrodes, Carbon Railway Track-work Co. Una Welding & Bonding Co.

Electrodes, Steel Railway Track-work Co. Una Welding & Bonding Co.

Una Weiding & Bonding Co.

Engineers, Consulting, Coutracting and Operating
Beeler, John A.

Buchanan & Layng Gorp.
Byllesby Co., H. M.
Day & Zimmermann, Inc.
A. L. Drum & Co.
Faile & Co., E. H.
Ford, Baccon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Keiker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Co., J. G., The
Eugines, Gas, Oli or Steam

Eugines, Gas, Oil or Steam Westinghouse E. & M. Co.

Exterior Side Panels Haskellte Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Ill Motive Equipment Co.
Percy Mfg. Co.

Fare Registers
Elec. Service Supplies Co.
Johnson Fare Box Co.

Fences, Woven Wire and Fence Pests Amer. Steel & Wire Co.

Fenders and Wheel Guards Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Fender Co. Star Brass Works

Fibre and Fibre Tubing Westinghouse E. & M. Co.

Field Colls (See Colls)

Floodlights
Elec. Service Supplies Co.
General Electric Co.

Floor, Sub Haskelite Mfg. Corp.

Floors Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.

Frogs & Crossings, Tee Rail Bethlehem Steel Co. Ramspo Ajax Corp. Wm. Wharton, Jr. & Co.

Fregs, Track (See Track Work)

Frogs, Trolley
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Fuses and Fuse Boxes
Columbia Machine Works
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

Gaskets Westinghouse Tr. Br. Co.

Gasoline Standard Oil Co.

Gas-Electric Drive for Buses General Electric Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car Brill Co., The J. G. Cincinnati Car Co. (Continued on page 40) "The Standard for Rubber Insulation"

INSULATED WIRES and CABLES

"Okonite," "Manson," and Dundee "A" "B" Tapes

Send for Handbook

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories, PASSAIC, N. J.

PATERSON, N. J.

s Offices: New York Chicago Pittsburgh St. Louis Birmingham San Francisco Los Angeles Seattle

Pettingell-Andrews Co., Boston, Mass. F. D. Lawrence Electric Co., Cincinneti, O. Novetty Electric Co., Phila., Pa.

Con. Rop.: Engineering Materials Limited, Montreat, Cubon Rop.: Victor O. Mendoza Co., Havana,





Double Register Type R-11

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

The International Register Co. 15 South Throop Street, Chicago, Illinois

The DIFFERENTIAL CAR



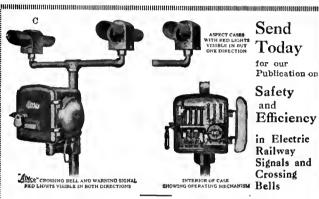
60 Railways for

Track Maintenance Track Meintenance
Track Construction
Ash Disposal
Coal Hauling
Concrete Materials
Waste Handling
Excavated Materials
Hauling Cross Ties
Snow Disposal

Use These Labor Savers

Differential Crane Car Clark Concrete Breaker Differential 3-way Auto Truck Body Differential Car Wheel Truck and Tracter

THE DIFFERENTIAL STEEL CAR CO., Findlay, O.



AMERICAN INSULATING MACHINERY Co., INC. 521 Huntingdon St., Philadelphia, Pa.



PHONO-ELECTRIC

Contact wire that gives three times the service of hard drawn copper. Hi-strength messenger and guy wires. Write for details.

Bridgeport Brass Co.





CREOSOTED

Railroad Cross-ties; Switch-ties; Bridge Timbers; Construction Timbers; Mine Timbers, Lumber; Piling; Poles; Posts and other Forest Products

rettyman & Sons de Preserving Plant Charleston, S.C.

Coin Counting and Sorting Machines

FARE BOXES

Lever-Operated and Slip Change Carriers

The Cleveland Fare Box Co.

Cleveland, Ohio Cenedian Cleveland Fare Box Co., Ltd., Preston,

CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

WITH OPEN COIL OR ENCLOSED ELEMENTS ELECTRIC HEATERS THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE

Haskelite Manufacturing Corporation, 133 West Washington Street, Chicago

\$ (CONTRACTOR | C .

SAMSON SPOT WATERPROOFED TROLLEY CORD



de of extra quality stock firmly braided and smoothly finished Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

Gear Blanks
Brill Co., The J. G.
Standard Steel Works Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinlons
Bemis Car Truck Co.
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.

Generators
General Electric Co.
Westinghouse E. & M. Co.

Girder Rnils
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs) Grinders & Grinding Sopplies Railway Track-work Co.

Grinders, Portable Electric Railway Track-work Co.

Grinders, Portable Railway Track-work Co.

Grinding Bricks and Wheels Rallway Track-work Co.

Guard Rail Clamps Ramapo Ajax Corp.

Guard Rails, Tee Rall and Manganese Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Guards, Trolley
Elec. Servica Supplies Co.
Chio Brsss Co.

Harps, Trolley
Columbia Machine Worke
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.
Star Brass Works

Headlights Elec. Service Supplies Co. General Electric Co. Ohio Brass Co.

Headlining
Columbia Machine Works
Haskelite Mig. Corp.
Pantasote Co., Inc.

Heaters, Electric Rivet American Car & Foundry Co.

Heaters, Rus Nichols-Lintern Co. Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Heaters, Car, Hot Alr and Water Smith Heater Co., Peter

Heaters, Car. Stove Smith Heater Co., Peter

Helmets, Welding
Railway Track-work Co.
Una Welding & Bonding Co. Hoists and Lifts Columbia Machine Works

Hose, Bridges Ohio Brass Co.

Hose, Pneumatle Westinghouse Tr. Br. Co.

Instruments, Measuring, Test-Ing and Recording
American Steel & Wire Co.
Geogral Electric Co.
Westinghouss E. & M. Co.

Insulating Cloth, Paper and Tape General Electric Co. Irvington Varnish & Ins. Co. Mica Insulator Co. Okonite Co. Okonite-Callender Cable Co.

OROME Inc. U. S. Rubber Co. Westinghouse E. & M. Co.

Insulating Machinery
Amer. Ins. Machinery Co.

Insulating Silk Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish and
Insulating Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co. Okonite Co. Okonite-Callender Cable Co. OROMACIAN.
Inc.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulation Slot Irvington Varnish & Ins. Co. Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Insulators (See also Line Materials) Materials)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ine. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Interior Side Linings Haskelite Mfg. Corp.

Interurban Cars (See Cars, Passenger, Freight, Express, etc.)

Jarks (See also Holsts and Lifts)
Columbia Machine Works
Elec. Service Supplies Co.

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Lamps, Gunrds and Flxtures Elec. Service Supplies Co. General Electric Co. Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights) General Electric Co. Westinghouse E. & M. Co. Lamps, Signal and Marker Elec. Service Supplies Co. Nichols-Lintern Co.

Lanterns, Classification Nichols-Lintern Co.

Letter Boards Cincinnati Car Co. Haskelite Mfg. Corp.

Lighting Flatures, Interior Electric Service Supplies Co. Lightning Protection Elec. Service Supplies Co. General Electric Co. Westinghouse E. & M. Co.

Brackets, Insulators,
Wires, etc.)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes Wm. Wharton, Jr. & Co. Loromotives, Electric Cincinnati Car Co. Cummings Car & Coach Co. General Electric Co. Westinghouse E. & M. Co.

Lubricating Engineers
Standard Cil Co.
Universal Lubricating Co.

Lubricants, Gil and Grease Standard Gil Co. Universal Lubricating Co.

Lumber (See Poles, Ties,

Machinery, Insulating
American Insulating Machinery Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Guard Rails Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Manganese Steel, Special Track Work Bethlehem Steel Co. Wm. Wharton, Jr. & Co.

Manganese Steel Switches, Frogs & Crossings Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Mica Insulator Co.

Mirrors, Inside and Outside Cincinnati Car Co.

Motors, Generators, & Con-trols for Gas Electric Buses General Electric Co.

Motor Buses (See Buses)

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Heywood Wakefield Co.

Motors, Electric General Electric Co. Westinghouse E. & M. Co. Nuts and Bolts
Bemis Car Truck Co.
Cincinnati Car Co.
Hubbard & Co.

Oxyacetylene—See Cutting Apparatus

Packing
U. S. Rubber Co.
Westinghouse Tr. Brake Co.

lating)
Electric Service Supplies Co.
Irvington Varnish & Ins. Co.

Paints and Varnishes, Railway Dixon Crucible Co. Nat'l Ry. Appliance Co.

Pickups, Trolley Wire Elec. Service Supplies Co. Ohio Brass Co.

Pinlon Pullers
Elec. Service Supplies Co.

Pinions (See Genrs)

Pins, Case Hardened, Wood and Iron Bemis Car Truck Co. Ohio Brass Co. Westinghouse Tr. Brake Co.

Pipe National Tube Co.

Pipe Fittings Standard Steel Works Co. Westinghouse Tr. Brake Co.

Planers (See Machine Tools) Plates for Tee Rail Switches Ramapo Ajax Corp.

Pllers, Rubber Insulated Elec. Service Sup. Co.

Plywood, Roofs, Headlinings Floors, Interior Panels, Bulkheads, Trnss Planks Haskelite Mfg. Corp.

Pole Line Hardware Bethlehem Steel Co. Elec. Service Supplies Co. General Electric Co. Ghio Brass Co.

Pale Reinforcing

Poles, Metal Street Bates Expanded Street Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.
Union Metal Mfg. Co.

Poles, Ties, Posts, Piling & Coles, Ties, Fosts, Fung a Lumber Co. Bell Lumber Co. International Crossoting & Construction Co. Naugle Pole & Tie Co. Prettyman & Sous, J. F.

Poles & Ties Treated American Creosoting Co. Bell Lumber Co. International Creosoting & Construction Co.

Poles, Trolley
Elec. Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Tube Co.

Potheads Okonite-Callender Cable Co., Okonite Co.

Power Saving Devices National Ry. Appliance Co.

Pressings, Special Steel Cincinnati Car Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Brake Co.

Punches, Ticket International Register Co.

Radiators Long Mfg. Co.
Rail Filler
Carey Co., The Philip Rail Braces & Fastenings Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joint Co.

Rail Joints, Welded Lorain Steel Co. Rall Welding
Railway Track-work Co.
Una Welding & Bonding Co.

Rails, Steel Electric Equipment Co.

Railway Safety Switches Consolidated Car Heat. Co. Westinghouse E. & M. Co.

Railway Welding (See Welding Processes)

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Elec. Service Supplies Co.
Hale-Kilburn Co.
Heywood Wakefield Co.

Begisters and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
International Register Co.

Reinforcement, Concrete Amer. Steel & Wire Co. Bethlehem Steel Co. Carnegie Steel Co.

Repair Shop Appliances (See also Coil Bunding and, Winding Marhires) Elec. Service Supplies Co.

Repair Work (See also Colls) Westinghouse E. & M. Co.

Replacers, Car Cincinnati Car Co. Elec. Service Supplies Co.

Resistance, Wire and Tube Westinghouse E. & M. Co.

Resistances Consolidated Car Heat. Co. General Electric Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westingbouse E. & M. Co. Rivet Heaters, Electric American Car & Foundry Co.

Roofing, Car Haskelite Mig. Corp. Pantasote Co., Inc.

Roofs, Car and Bus Haskelite Mfg. Corp.

Rubber Specialties of Ali Kinds U. S. Rubber Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car Brill Co., The J. G. Cincinnati Car Co.

Sash Metal Car Window Hale-Kilburn Co.

Scrapere, Track (See Cleaners and Scrapers, Track) Serew Drivers, Rubber Insulated Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Haskelite Mfg. Corp.
Heywood Wakefield Co.
Pantasota Co., Inc., The

Seats, Bus Brill Co., The J. G. Hale-Kilburn Co.

Seats, Car (See also Rattan) Brill Co., The J. G. Cincinnati Car Co. Hale-Kilburn Co. Heywood Wakefield Co.

Second Hand Equipment Abel, G. T.
Electric Equipment Co.
Hyman Michaels Co.
Van Loan Corp., Irving S.

Shades, Vestibule
Brill Co.. The J. G.
Cincinnati Car Co.

Shovels

Brill Co., The J. G.

Hubbard & Co.

Shovels, Power Brill Co., The J. G. Signals, Car Starting Consolidated Car Heating

Co.
Elec. Service Supplies Co.
National Pneumatic Co.

Signal Systems, Block Elec. Service Supplies Co. Nachod and U. S. Signal Co., Inc. Union Switch & Signal Co.

Signal Systems, Highway Crnssing Nachod and U. S. Signal Co., Inc. Slark Adjusters (See Brake Adjusters) Sleet Wheels and Cutters Cincinnati Car Co. Columbia Machine Worke Elec. Ry. Equipment Co. Elec. Service Supplies Co. Nuttall Co., R. D.

Smokestacks, Car Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brioms
Brill Co., The J. G.
Columbia Machine Works
Consolidated Car Fender Co.
Cummings Car & Coach Co.

Snow Sweeper, Rattan Heywood Wakefield Co.

Soldering and Brazing (See Welding Processes and Apparatus)

Special Adhesive Papers Irvington Varnish & Ius. Co.

Special Trackwork Bethlehem Steel Co. Lorain Steel Co., The Wm. Wharton, Jr. & Co.

Spikes Amer. Steel & Wire Co.

Splicing Compounds
U. S. Rubber Co.
Westinghouse E. & M. Co.

Splicing Sieeves (See Clampa and Connectors)

Springs, Car and Trock
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.

Sprinklers, Track and Road Brill Co., The J. G. Cummings Car & Coach Co.

Steel and Steel Products
American Steel & Wire Co.

Steps, Car Brill Co., The J. G. Cincinnati Car Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batterles (See Bat-terles, Storage) Strain, Insulatore Electric Service Supplies Co. General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co.

Strand American Steel & Wire Co. Roebling's Sons Co., J. A.

Street Cars, Passenger (See Cars, Passenger, Freight, Express, etc.)

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures Ramapo Ajax Corp.

Switches General Electric Co.

Switches, Selector Nichole-Lintern Co. Switches and Switchboards Consolidated Car Heating Co. Elec. Service Supplies Co. Westinghouse E. & M. Co.

Switches, Tee Rail Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tie Railway Track-work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rall Special Track Work Ramapo Ajax Corp.

Telephone and Telegraph
Wire
American Steel & Wire Co.
J. A. Roebling's Sons Co.
(Continued on page 42)



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 20-32 West Randolph Street. Cincinnati, Traction Bldg.: New York, 100 E. 42nd St.



Don't Take Cars Out Of Service To Turn Worn Wheels

HE WHEEL TRUING BRAKE SHOE does the work while your car is in service. Don't jeopardize your schedules by excessive pull-ins owing to wheel troubles. Use Wheel Truing Brake Shoes and keep the maximum equipment in service. They save time, labor and money.

> WHEEL TRUING BRAKE SHOE CO. Detroit, Mich.



CAYLO

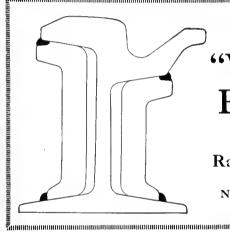
Coil and Elliptic

SPRINGS

insure easy riding cars and reduce maintenance

TAYLOR ELECTRIC TRUCK CO.

TROY, N. Y., U. S. A.



.

"Weld Plates"

The Rail Joint Co.

165 Broadway New York, N. Y.

097100001142971419717171111171727177991727171017171

WESTERN -CEDAR POLES-

BUTT TREATING

TIES

BELL LUMBER CO., Minneapolis, Minn.

Rod, Wire and Cable Products

ANACONDA COPPER MINING COMPANY THE AMERICAN BRASS COMPANY General Offices - 25 Broadway, New York

NACONDA TROLLEY WIRE

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

Efficient Bus Heating

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.

7960 Lorain Ave.

Cleveland, Ohio

H B LIFE GUARDS

PROVIDENCE FENDERS

Manufactured by

CONSOLIDATED CAR FENDER CO., PROVIDENCE, R. I.

General Sales Agents
WENDELL & MacDUFFIE CO., 110 E. 42nd St., N. Y. C.



CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetless—Light Weight Best for Service — Durability and Economy. Write Us.

Chillingworth Mfg. Co. Jersey City, N. J.



STUCKI SIDE BEARINGS

A. STUCKI CO. Oliver Bldg. Pittshurgh, Pa.



.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
Abel, G. T	Earll, C. I	Kelker, DeLeuw & Co 34 Kuhlman Car CoThird Cover	Ramapo Ajax Corp
American Car Co. Third Cover American Creosoting Co. 29 American Electrical Works. 41 American Insulating Machinery 39 Co. 39 American Steel & Wire Co. 27 Anacanda Copper Mining Co. 41	Faile & Co., E. H	Long Mfg, Co	Samson Cordage Works 39 Sanderson & Porter 34 Searchlight Section 37 Smith Heater Co., Peter 35 Standard Oil Co. 22 Standard Steel Works Co. 15 Star Brass Works, The 36
Babcock & Wilcox Co	General Electric Co	Morganite Brush Co., Inc 30	Stevens & Wood, Inc. 34 Stone & Webster 34 Stucki Co. 41 Susquehanna Traction Co. 37
Bemis Car Truck Co	Hale-Kilburn Co	Nachod and United States Signal Co., Inc. 32 National Brake Co. 19 National Pneumatic Co. 11 National Pneumatic Co. 32 National Tube Co. 31 Naugle Pole & Tie Co. 39 Nichols-Lintern Co., The 41 Nuttall Co., R. D. 30	Taylor Electric Truck Co
Chillingworth Mfg. Co. 41 Cincinnati Car Co. 12-13 Cleveland Fare Box Co. 39 Clinton St. Ry. Co. 37 Collier, Inc., Barron G. 28 Columbia Machine Works &	Hyman-Michaels Co	Ohio Brass Co. 5 Okonite-Callendar Cable Co., Inc. 39 Okonite Co., The 39	Universal Lubricating Co., The. 35 Van Loan Corp., Irving S 37 "Want" Ads
M. 1. Co. 32 Consolidated Car Fender Co. 41 Consolidated Car Heating Co. 42 Cummings Car & Coach Co. 8	International Crossoting Co	Pantasote Co., The	Wason Mfg. Co
Day & Zimmermann, Inc. 34 Detroit, Mich., Dept. of St. Rys. 37 Differential Steel Car Co., The. 39 Drum & Co., A. L. 34	Jackson, Walter 34 Johnson Fare Box Co 32	Rail Joint Co., The	38-40-42 Wheel Truing Brake Shoe Co

WHAT AND WHERE TO BUY-Continued from page 40

Telephones and Parts Elec. Service Supplies Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating
Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Tles and Tie Rods, Steel International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires

Firestone Tire & Rubber Co. U. S. Rubber Co.

Tongue Switches Wm. Wharton, Jr. & Co. Tools, Track & Miscella-

neoos Amer. Steel & Wire Co. Columbia Machine Works Elec. Service Supplies Co. Hubbard & Co. Railway Track-work Co.

Towers and Transmission Bates Expanded Steel Truss Westinghouse E. & M. Co.

Track Grinders Railway Track-work Co. Ramapo Ajax Corp

Track, Special Work Columbia Machine Worke Ramapo Ajax Corp.

Trackless Trolley Cars Brill Co., The J. G.

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety Stair Car Steps Cincinnati Car Co.

Tree Wire Okonite Callender Cable Co. Okonite Co.

Trolley Bases
Ohio Brass Co.
Nuttall Co., R. D.
Westinghouse E. & M. Co.

Trolley Bases, Retrieving Nuttall Co., R. D.

Trolley Buses
Brill Co., The J. G.
General Electric Co.

Trolley Material, Overhead Elec. Service Supplies Co General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wheel Bushings Star Brass Works

Trolley Wire
American Brass Co.
Amer Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgenort Brass Co., The
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Taylor Electric Truck Co.

Truss Planks Haskellte Mig. Corp. National Tube Co.

Tuhlug, Steel National Tube Co.

Tubling, Yellow & Black Flexible Varnishes Irvington Varnish & Ins. Co.

Turbines, Steam General Electric Co. Westinghouse E. & M. Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Turntables
Elec. Service Supplies Co.
Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Vaculshed Papers & Silks Irvington Varnish & Ins. Co.

Varnishes (See Paints, etc.)

Ventllators
National Ry. Appliance Co.

National My. Apphasice of Ventilators, Car Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Heating Co. Nichols-Lintern Co. Railway Utility Co. Vestibule Linlegs Haskelits Mfg. Corp. Walded Reil Joints

Welded Rail Joints Lorain Steel Co. Railway Trackwork Co. Una Welding & Bonding Co. Weiders, Fortable Electric General Electric Co. Ohio Brass Co. Railway Track-work Co. Una Weiding & Bonding Co. Westingbouse E. & M. Co.

Welders, Rail Joint General Electric Co. Ohio Brass Co. Railway Track-work Co.

Welding Processes and Apparatus Ohio Brass Co. Railway Track-work Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Welding Steel
Railway Track-work Co.
Una Welding & Bonding Co.

Welding Wire American Steel & Wire Co. Railway Track-work Co. Roebling's Sons Co., J. A.

Welding Wire and Rode Railway Track-work Co.

Wheels, Car, Steel & Steel Tired Bemis Car Truck Co. Standard Steel Works Co.

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Nuttail Co., R. D.
Ohio Brass Co.
Star Brass Works

Wheel Guards (See Feuders and Wheel Guards)

Wheel Grinders Wheel Truing Brake Shoe

Wheel Truing Brake Snoe Co. Wheel Presses (See Machine Tools) Whistles, Air Ohio Brass Co. Westinghouse E. & M. Co. Westinghouse Traction Brake Co.

Window Guards and Fittings Cincinnati Car Co.

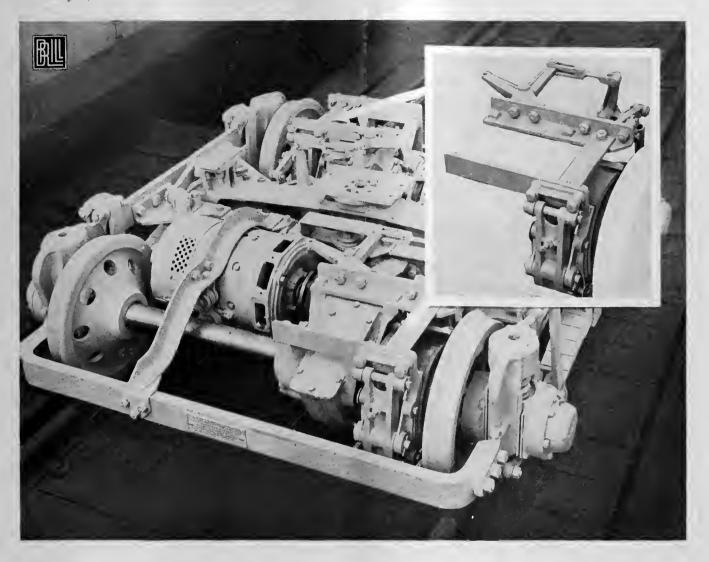
Cincinnati Car Co.
Wire Rope
American Steel & Wire Co.
Roebling's Sone Co. J. A.
Wires and Cables
American Brass Co., The
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Mining
Co.

Co. Bridgeport Brass Co., The Okonite Co. Okonite-Callender Cable Co.,

Inc.
Roebling's Sons Co., J. A.
Westinghouse E. & M. Co. Wood Preservatives
American Creosoting Co.







The Absence of Complicated Parts Permits Easy Brake Inspection

HE external contracting shoe-type drum brakes of the Brill 1928 Model Car were designed to eliminate many rigging parts. This was accomplished by pressing a wide drum on each axle, diagonally opposite each other and connecting the air cylinders direct to the pressure applying levers. Each air cylinder is placed directly adjacent to the drum.

This elimination of rigging parts reduces noise and increases brake efficiency, yet inspection is as simple a process as with the commonly used brake shoe and head applied to the wheel.

The removal and replacement of brake blocks in this new shoe-type drum brake can be accomplished without removing wheels, drums or any other parts.



THIS worm and gear were removed from a motor coach operated by the Mesaba Transportation Company of Hibbing, Minnesota, after 585,000 miles of trouble-free service.

The bronze gear shows a little wear; the worm itself, none. They are ready to go back into service—and from all indications would go another 585,000 miles.

It is excellent proof that worm-drive is sturdy, long-lived, efficient—the ideal final drive.

ELECTRIC RAILWAY JOURNAL

raw-Hill Publishing Company, Inc.

FEBRUARY 11, 1928

Twenty Cents per Copy





What the Public

Has Been Waiting for

THE enthusiastic crowds in Brooklyn that greeted the new W-N drive car at every stop are evidence of the public's interest in improved transportation.

Their whole-hearted appreciation of the many superior qualities of the W-N drive is forcefully expressed in some of their written comments:

"What the people of Brooklyn have been waiting for."

"A trolley with comfort supreme, why own an automobile?"

"100% better than any cars yet seen in Brooklyn."

"Something long looked for and wished for."

and thousands of others.

Such comments handed in by patrons after riding are proof that the W-N drive supplies the quietness, comfort and speed the public has been waiting for.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of the United States and Foreign Countries





W-N Drive Installation

Lowest steps
Faster acceleration
Quiet operation
Motors spring borne
Gears run in oil
Greater clearance
Lighter weight
Lower maintenance

Westinghouse

MORRIS BUCK Managing Editor JOHN A. MILLER, JR. Associate Editor CLARENCE W. SQUIER Associate Editor

EUEGIRIG RAILWA

GEORGE J. MACMURRAY News Editor PAUL WOOTON Washington Correspondent ALEX McCALLUM Editorial Representa London, England

HENRY W. BLAKE Senior Editor

CHARLES GORDON, Editor

Vol. 71 No. 6

CONTENTS

Pages 225-264

FEBRUARY 11, 1928

Most People Are Fair When They Understand	Editorials225
The street railway business has put its worst difficulties behind. The industry now needs new confidence in itself and the courage to tell its story to the public. How a Small City Property Was Resuscitated	
The story of the Pueblo property tells how the electric railway in a city of about 50,000 inhabitants was saved from abandonment by co-operation between the public and the company. Small Property Perfects Safety Methods	The street railway business has put its worst difficulties behind. The industry now needs new confidence in itself and the courage
Tide Water Company of Wilmington, N. C., has won two prizes for excellence in safety precautions. Its methods are detailed. Pittsburgh Protects Passengers and Pedestrians	The story of the Pueblo property tells how the electric railway in a city of about 50,000 inhabitants was saved from abandonment
Railway adopts railed safety zones, extensive system of pavement marking and other means for reducing accidents to patrons and other users of the street. Single-Phase Equipment for New York, Westchester & Boston Railroad	
& Boston Railroad	Railway adopts railed safety zones, extensive system of pavement marking and other means for reducing accidents to patrons and
s1,000 Erects Attractive Station at Little Rock	& Boston Railroad235
Maintenance Methods and Devices	Extension of the company's lines and increased traffic resulted in
New Equipment Available	\$1,000 Erects Attractive Station at Little Rock240
Association Activities	Maintenance Methods and Devices241
Advantages of High-Speed Railway Motors	New Equipment Available243
By N. W. Storer. Keep on the Move or Die	Association Activities
By Lucius S. Storrs. Traffic Lights Relieve Congestion	
By R. W. EMERSON. Brakes as They Affect Schedule Speeds and Accidents. 247 By E. R. FITCH. Band Brakes in Experimental Stage	
By E. R. FITCH. Band Brakes in Experimental Stage	
By A. D. McWhorter. American Association News	
Affiliated Association Committee Appointments	
News of the Industry.252Recent Bus Developments.256Financial and Corporate.257	American Association News248
Recent Bus Developments	Affiliated Association Committee Appointments249
Financial and Corporate257	News of the Industry252
	Recent Bus Developments256
Book Reviews	Financial and Corporate257
	Book Reviews

Ideals of Journalism

PRESIDENT COOLIDGE, at the dedication of the National Press Club building Washington, urged the press of the country to arise to its opportunity and "contest with our universities as an influence for education." With these ideals technical journalism is in rapport. It stands at the third corner of a triangle and ties together the idealism of the educator and the practicality of industry.

In reporting and interpreting events and conditions in the railway field ELECTRIC RAILWAY JOURNAL aspires to be a source of education and idealism to its readers. tempers criticism with discrimination. it champions the progress of the industry as a whole and does not hesitate to condemn practices which, though they seem expedient for the moment, are not in the interests of general and permanent progress.

In the words of President Coolidge, the constructive publication is not the voice of the editor but the voice of public expression. So the JOURNAL is the collective expression of the thought, the hope, the aspiration and the faith of its industry.

McGRAW-HILL PUBLISHING COMPANY, INC.

Tenth Avenue at 36th Street, New York, N. Y. New York District Office, 285 Madison Ave.

JAMES H. MOGRAW, President
JAMES H. MOGRAW, Jr., V.-P. and Tross.
MALOOLM MUIR, Vice-President
EDWARD J. MEHREN, Vice-President
MARON BUITTON, Vice-President
EDGAR KORBE, Vice-President
C. H. THOMPRON, Secretary

WASHINGTON: National Press Building CHICAGO: 7 S. Dearborn Street 7 S. Dearborn Sures:
PHILADELPHA:
1600 Arch St.
CLEVELAND:
Guardian Bullding
ST. Louis:
Bell Telephoc Bullding
SAN FRANOISCO:
883 Mission Street
London:

LONDON:
6 Bouverle Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

Cable Address: "Machinist, N. Y." Publishers of

Engineering News-Record
American Machinist

American Machinist
Power
Chemical and Metallurgical Engineering emical and Metallurgical Engineer Cool Age
Engineering and Mining Journal
Ingenieria Internacional
Bus Transportation
Electric Railtony Journal
Electrical Workandising
Radio Retailing
Construction Methods

Blectricol West (Published in San Francisco)

American Machinist-European Edition (Published in London)

Member Audit Bureau of Circulations

The annual subscription rate is \$4 in the United States, Canads, Mesico, Alaska, Haweil, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brasil, Spain, Uruguay, Costa Rica, Ecuador, Ouatemaia, Chile and Parsayay, Estroreign postage to other countries \$3 (total \$7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

Copyright, 1928, by McGraw-Hill Publishing Company, Inc.

Puhlished weekly. Entered as second-class matter, June 23, 1908, at the Post Offica at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

One Less Maintenance Item



EACH wheel removal is another addition to the maintenance burden. Equipment lies idle while men, material and shop facilities are engaged in re-conditioning wheel contours.

Because of their long, slow-wearing life Davis "One-Wear" Steel Wheels keep clear of the shop. They never need re-turning.

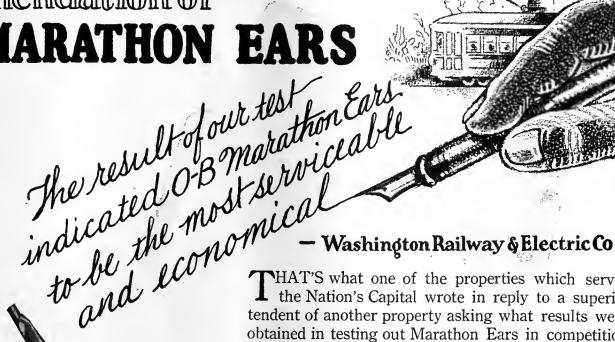
The reason lies in the special composition steel that possesses the unique qualities required for a true "One-Wear" Steel Wheel.

AMERICAN STEEL FOUNDRIES
NEW YORK CHICAGO ST.LOUIS

DOLLARS AND SENSE

at the Nation's Capital prompted this recommendation of

MARATHON EA



THAT'S what one of the properties which serves the Nation's Capital wrote in reply to a superintendent of another property asking what results were obtained in testing out Marathon Ears in competition with other makes of ears.

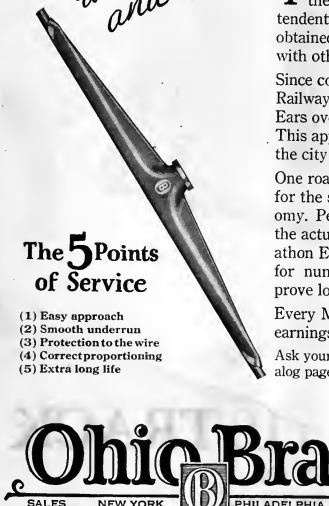
Since completing the tests referred to, the Washington Railway & Electric Co. has been installing Marathon Ears over its entire system, as new ears are required. This applies, of course, to the suburban sections, as in the city proper underground operation prevails.

One road after another has standardized on Marathons for the same reasons of better service and greater economy. Performance records have demonstrated to them the actual dollars and cents savings possible with Marathon Ears. We believe they hold the world's record for number of car passes per ear. If that doesn't prove longer life, nothing does.

Every Marathon Ear on the wire means bigger net earnings through lower operating expense.

Ask your O-B Salesman for complete details and see O-B Catalog page 534.

Ohio Brass Company, Mansfield, Ohio Canadian Ohio Brass Co., Limited Niagara Falls, Canada



SAN FRANCISCO

PORCELAIN INSULATORS INE MATERIALS RAIL BONDS AR EQUIPMENT MINING MATERIALS VALVES

THE ENLARGED SECOND

—a book of paved track construction information for Electric Railway Executives

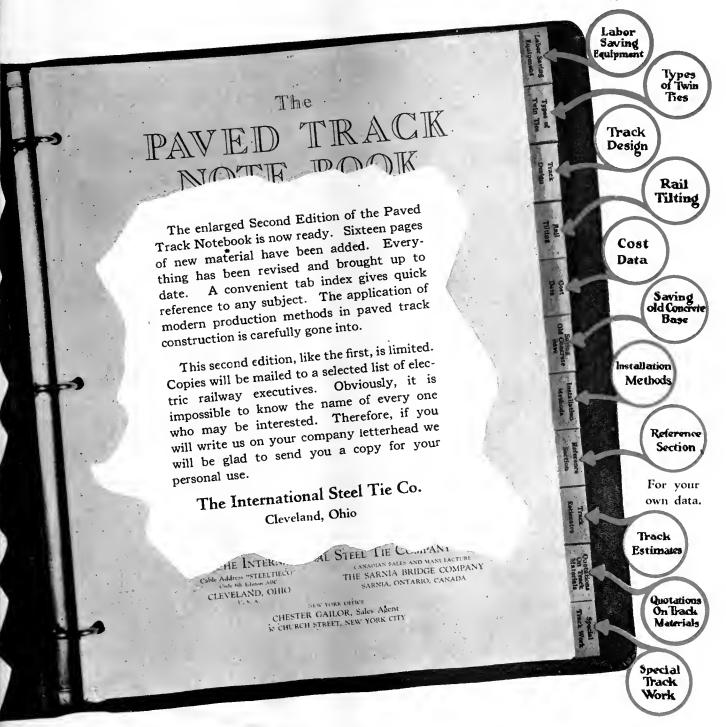


STEELTWIN TIE TRACK

THE BASE OF MODERNIZATION

EDITION IS INDEXED!

Valuable information carefully indexed for your convenience.



STEELTWIN TIE TRACK

MODERNIZE THE TRACK AND METHODS



Accelerating Traffic by Better Decelerating

The Westinghouse Variable Load Brake helps to accelerate traffic because—

It automatically adjusts braking effect to suit car loading.

Its effectiveness is independent of fluctuation in main reservoir pressure.

It decreases the time of brake application and release.

It permits a higher rate of retardation.

The result — consistently shorter stops.

Let our representative amplify and demonstrate the foregoing statements.

Perhaps the Variable Load Brake will help solve your traffic problem.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



If a Keystone Case gets dented— just straighten it out!

If a malleable iron case hits an obstruction in the roadbed or if the lower half drops, it may derail the car or break the motor frame. But a Keystone Steel Gear Case will merely bend and buckle—and the car will ride by. Then the Keystone Gear Case can be taken to the shop and pounded back into shape. If too badly smashed it is a simple matter to replace the lower half at small expense.

The steel that goes into Keystone Gear Cases is a soft, open-hearth, deep-drawing steel. It is tough enough to protect the gear and pinion—has body enough to absorb all vibrations—and is flexible enough to bend and buckle so as to prevent serious accident as mentioned above.

The Keystone Steel Gear Case is both riveted and welded, the rivets hold the sheets together—providing the necessary tensile strength. The spot-welds unite the sheets at the welds into a homogeneous mass—preventing the sheets from slipping one upon the other. By staggering the rivets and the welds all the advantages of both methods are obtained without the disadvantages of either method.

The halves of any given type of Keystone Cases are interchangeable. This insures perfect fit before they leave our shop and also enables you to replace either half if it becomes irreparably damaged.

Ask for more complete particulars.

Essco Catalog No. 7 lists the entire line of Keystone Car Equipment. Send for your copy.



KEYSTONE Steel Gear Cases

Home effice and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadisn Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL



Safety Cars are giving a noteworthy impetus to transportation service on leading railway properties.

Quicker Transportation

. with SAFETY

Some factors that help speed up transportation service are . . . short headway between cars to reduce waiting time of patrons . . . quick brake application to reduce time consumed in making stops . . . rapid interchange of passengers to cut down standing time . . . prompt release of brakes to permit quick get-away.

The Safety Car Control Equip-

ment enables these vital factors to be combined with the basic element of safety. It brings economic advantages that warrant additional cars . . . assures the quickest possible brake action . . . provides the maximum convenience and flexibility in controlling entrance and exit . . . safeguards operation by interlocking power, brakes, and doors, and by centralizing responsibility.





OPEN

road driving at night requires one kind of light ... City driving and passing demands another. . . And both are possible from one headlamp if that headlamp is Guide Tilt Ray. . Two lights in one . . always under control without removing hands from the wheel. . . The Guide Motor Lamp Mfg., Co. Cleveland, Ohio.

Guicle TILT RAY HEAD LAMPS

GUIDE

Combination Stop-Tail Lamps

No motor-coach is properly equipped unless it carries efficient and dependable Stop-Tail Lamps. The models shown here have been designed particularly for motor-coach service and are built with the same skill and careful workmanship which characterizes all Guide Products.





GUIDE Dome Lamps

Interior lighting in a motor-coach is either an asset or a liability. The well lighted coach attracts, while the dim interior creates ill-will. That is why Guide has specialized for a long time on interior lighting and is able to offer operators the most up-to-the-minute system of inside lighting –the dome lamp. The two numbers shown here are typical of the most complete line available today.





GUIDE Marker Lamps

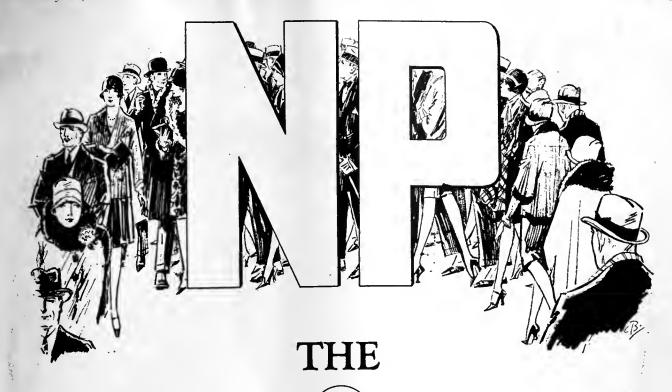
No matter what your requirements of a marker lamp may be, you can take care of them satisfactorily with Guide. The two models shown here are representative of the quality, design and construction to be found thruout the whole Guide Marker Lamp line.





Motor Lamp Manufacturing Co.

> CLEVELAND OHIO.





TREADLE DOOR

is used with efficient results by many properties—from the largest to the smallest—all over the country as well as abroad.

There must be a reason for such widespread adoption.

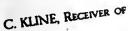
NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

PHILADELPHIA

1010 Colonial Trust Building

February 11, 1928 "93,000 MILES without



Tulsa Street Railway Company

Tulsa. Oklahoma

Mr. H. E. Listman, Vice Pres., Yellow Mfg. Sales Corp., 5801 West Dickens Avenue, Chicago, Illinois.

I am attaching hereto photograph of our No. B-700 Type X-21 Yellow Coach, which had, at the Dear Mr. Listman: time photograph was made, an operating record of 93,000 miles without the head or pan being removed. When this coach was taken in for inspection and prospective overhaul, it was merely cleaned up thoroughly and new pistoh rings installed, end immediately put back into service with no other attention whatever. of 101,000 miles and is going strong.

It is not our practice, of course, to operate our coaches continuously for such lengthy periods without inspection and overhaul, as our schedule of overhaul is every inspection and overnaul, as our schedule of overnaul to see just what the However, we were anxious to see just what the Yellows would do, and therefore allowed the B-700 to go beyond

This record, to my mind, speaks for itself, and should convince any prospective purchaser of coach equip the schedule. ment that Yellow Coaches are designed and built for dependable service.

With kind regards,

I am,

Yours very truly,

a reme Receiver of

TULSA STREET RAILWAY COMPANY

removing head or pan"



Need we add to this letter?

93,000 miles without removing head or pan, and then—cleaning new piston rings and back on the job greedy for more mileage.

That's Performance!

YELLOW COACH

A General Motors Product

YELLOW TRUCK & COACH MANUFACTURING CO. SUBSIDIARY GENERAL MOTORS CORPORATION
5801 WEST DICKENS AVENUE, CHICAGO, ILL.

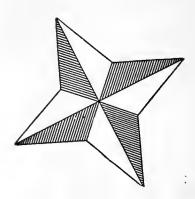
Every other Vehicle has up to the minute brakes—



why not your electric cars?

Two wheel brakes and four wheel brakes; vacuum brakes, hydraulic brakes and "booster" brakes,—practically every vehicle on the highways these days has stopping equipment that works like magic.

Electric railway cars have good brakes too. Usually they are as efficient as "the other fellow's." But the point is, they should be a good deal better,—especially in emergency.



Cincinnati engineers found this out quite some time ago. They developed and perfected the Cincinnati Duplex Air-Magnetic Braking Equipment which has since been made an integral part of the Cincinnati Balanced High Speed Truck. Furthermore, this important advance has been proved in actual every day city and interurban service on two of the most progressive properties in the country. It has shown conclusively that stopping time may be decreased 30% to 60% with a very small initial investment and nominal maintenance.

Why, then, should your modern cars, striving to give fast, safe service, be handicapped in the race with traffic?

CINCINNATI CAR COMPANY
CINCINNATI, OHIO

CINCINNATI BALANCED CARS

The Four Features of Balanced Design are the Cardinal Points of today's demand





The Thermit Insert Weld which has been used in electric railway work since 1912, is basically the same today as then. The only changes have been in a simplification of the process and a reduction in the amount of material used, with corresponding decreases in the cost of installation.



METAL & THERMIT CORPORATION?

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO



More Timken Equipped Brill Cars for the New Haven

The durability of Brill gas-electric cars on the New York, New Haven and Hartford is increased by the use of Timken Bearings in the journals and in the drive.

Few bearing applications present more difficult load complications. Timken tapered design, Timken POSITIVELY ALIGNED ROLLS and Timken-made electric steel have proved adequate for all the thrust, shock and radial reactions.

Not only is every form of wear resisted to the utmost but the highly frictionless operation of Timkens, together with ease of perfect closure, saves both fuel and lubricant. Destructive starting effects are eliminated and passenger comfort is enhanced.

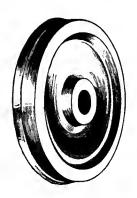
Engineering advancements and operating economies of the kind typified by Timken Tapered Roller Bearings are now responsible for another New Haven order for Brill Timken-equipped cars.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN Tapered ROLLER BEARINGS



One Thought-Home; and One Means of Getting There—the Electric Railway



Rush hour traffic....hundreds of men and women pouring forth from office, factory and store....all with a single purpose—to reach home—and a single means of realizing it—electric railway service.

That the public is so seldom disappointed is high tribute to the management of the transit companies and the efficient equipment they select. That Gary Wrought Steel Wheels may be found under so many coaches is a tribute to the design, workmanship and materials that these wheels embody.

Illinois Steel Company

General Offices: 208 South La Street

Chicago, Illinois

For the fourth time

--Public Service (New Jersey) specifies G-E electric drive

December 1925--333 G-E electric drives

March 1926-- 43 G-E electric drives

February 1927--107 G-E electric drives

January 1928--331 G-E electric drives

The total--814 G-E electric drive equipments in 25 months for one company --is convincing evidence of the results obtained from the operation of G-E equipped gas-electric buses.



GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, February 11, 1928

Number 6

It Depends on Whose Ox Is Gored

WHILE New York, under the leadership of its genial Mayor, Jimmie Walker, is marshalling its forces to fight to the last ditch the application of its rapid transit lines for a fare increase from 5 cents to 7 cents, there comes an interesting side light on how political expediency changes the tune with which the public's ears are regaled in the country's metropolis.

Speaking of plans for the extension and improvement of the water supply (a municipally-owned enterprise) the Mayor calls the attention of the Board of Estimate to the need for increased revenue. The water rates, he thinks, should be increased. He is reported by the New York *Times* to have said: "I myself paid \$13.20 last year and that was for a three-story house in which seven persons lived. A 10 per cent increase would mean \$1.32 more. I guess that wouldn't break me, and I don't think any taxpayer would object seriously to so modest an increase."

This is a numicipal plant, of course. One's nerves could scarcely survive the shock of hearing a New York public official use that reasoning in connection with a privately-owned utility. The very arguments of expanding plant and improving service which are used by the so-called "traction interests" in soliciting a higher rate of fare are howled down by the defenders of the people in the one instance and used by them for the same proposition when it comes to the municipally-owned service. Of course, this doesn't demonstrate that the arguments are wrong. It only proves anew the old saw that it makes all the difference in the world whose ox is gored.

Let "Convenience for the Greatest Number at the Least Cost" Be the Slogan

In ITS issue of Sept. 17, 1927, Liberty labeled street cars as archaic and on their way out. It called upon the motor car manufacturers of the country to produce a statesman of transportation who should lead us out of the hopeless traffic tangle which exists not only in large but in smaller cities as well.

ELECTRIC RAILWAY JOURNAL, in its issue of Sept. 24, challenged that suggestion from the standpoint of the public interest. Simultaneously, Mr. Storrs, managing director of the American Electric Railway Association, offered to supply *Liberty* with fundamental data regarding the relative importance of various transportation agencies in handling the masses of people who daily move back and forth on city streets.

Now Liberty has done a commendable thing. It started out to get the facts on the traffic situation. It interviewed men who are in position to talk with authority on this subject. And in a series of three articles, the last of which was published in its Feb. 11, 1928, issue,

William F. Sturm tells the story of the traffic tangle in the light of this new knowledge. Mr. Sturm got the facts. *Liberty* had the courage to publish them. In doing so it "scooped" the entire popular press of the country in presenting for the first time so comprehensive a discussion of the baffling problem of traffic from the standpoint of the public interest.

Mr. Sturm, as the result of his investigations, concluded that a fair solution of the problem requires adequate consideration of all the transportation factors involved in it-automobiles, street cars, rapid transit lines, and railroads. He omitted trucks used in the movement of freight and commodities on city streets. which should also be included. He then says: "The co-ordination of all methods of transportation is necessary in order to solve the problem in the broadest way. While it may be true that the motor industry is directly responsible for traffic saturation, still the problem does not belong to it alone. Steam and electric roads should see the wisdom of such an institute to study the problem from the standpoint of the public interest and to develop economically sound principles for bringing about relief." (The italics are ours.)

Regardless of the merit or practicability of the idea of a traffic institute, electric railways need little urging to take an interest in the traffic problem. Not only are they now taking a very active interest, but they are auxious to promote a sane solution. They are content to rest their case of the right to existence on the broad ground of the public interest and to have the matter of traffic congestion relief approached on the principle of the greatest good to the greatest number. In Chicago the railway has definitely taken the lead in championing the public's interest in traffic matters. The results already achieved there are making traffic history and testify eloquently to the public-spirited viewpoint of the railway's engineers and to the good judgment of the public in placing its traffic problem in their hands.

The viewpoint from which the traffic matter is approached and the principles upon which proposed relief measures are based (or the lack of them), affect the economic soundness of plans that are suggested. There is hopeless confusion of thought on the whole subject and total lack of public understanding. Even experts differ widely on some of the fundamental factors involved. Traffic and transportation are tied inseparably with the broad problems of civic development and community Yet many city planning commissions give planning. totally inadequate attention to making adequate provision for vitally needed rapid and economical transportation. The JOURNAL hopes that the popular press of the country will follow Liberty's lead in going after the facts of the traffic tangle. Then let the solution be championed under the banner: "Convenience for the greatest number at the least cost."

Interborough Fare Case Presents Interesting Legal Aspects

AS A RULE, better progress can be made by railway companies in securing necessary fare increases by frank dealing with the authorities and public than by resort to the courts. There are times, however, when the courts are the only recourse. This may be the case in New York with the Interborough Rapid Transit Company if its request for a higher fare is refused by the Transit Commission for want of authority or on any other ground.

For years the company has been endeavoring to give service at an inadequate fare. To do so it has asked the holders of its securities to make sacrifices, which for the most part they have done. But when the Transit Commission recently indicated that it intended to order the company to spend \$39,466,000 for new cars, platform extensions and other changes, it was obvious that some positive movement for relief had to be made. Without a higher fare the necessary capital for these changes could not be secured.

While the Interborough application is based on the usual ground that the company is not receiving a reasonable return on the fair value of the property, its petition to the Transit Commission is especially interesting from a legal standpoint for two reasons. because of the unusual franchises under which the company operates. The other is because it groups in its exhibit of return the earnings, expenses and rental of a leased property, the Manhattan Elevated Railway, though it also claims that a fair return is not being earned on the subway system itself. The Manhattan Railway is considered part of the system covered by the so-called 1913 contract because, in that contract, through services over certain of the two divisions were required, free transfers between them were specified at certain points and the city acquired a right to share in the earnings of the Manhattan Railway third track and extensions.

While the city is the owner and lessor of the subway proper, as distinguished from the equipment, the company holds that in this capacity the city is acting in a proprietory, and not in a governmental, capacity. Hence, its status in this ownership is similar to that of any railroad company and the fares to be charged on its leased subway track are subject to the regulatory power of the state. To strengthen this contention the company points out that nowhere does its franchise say that the fares to be charged are to be determined by the city authorities.

The financial returns of the company for 1927, based on the Transit Commission's figures of reproduction costs, vary from 1.76 per cent for the Manhattan Elevated Railway, to 2.98 per cent for the subway division. The returns during each of the previous six years are not greatly different.

Besides this low return on the value of the property, the company urges several special circumstances which emphasize the justice of its claim. One of these is that the city, though a partner in the enterprise both in investment and in profits, is building a competing rapid transit railway that will take from the company's lines at least 110,000,000 passengers a year. This competition, it points out, was not contemplated in the 1913 leases and contracts. The second circumstance is the proposed order of the Transit Commission for new cars and the order actually made for extension of local platforms and other

changes, as already mentioned. It is obvious that some means must be found to improve the company's credit if it is to raise the money to carry out the commission order for improved facilities.

The essential relation between service and fare has been placed squarely before the New York public, which has been so long misguided by the 5-cent fare fetish of its politicians. For the best interests of the city, the higher fare should be granted.

Home Construction of Cars Is Deceptive Economy

SOME few street railway managements in this country are under the impression that they can build their own cars at a price lower than similar cars can be purchased from a car builder. "We must have our shops for maintenance work anyway," they argue, "and we can save most of the overhead cost on any cars which we build. Moreover, a certain amount of car construction will give a better load factor on our men because they can fill in time on car building which otherwise would be lost."

The idea that there is economy in cars so built is specious. There is every reason why a car builder can put out a better car and build it more cheaply than a railway company. When car bodies were entirely of wood, the differential in cost between the car builder and the repair shop was smaller. But economical steel car building requires machinery and methods which are out of place in the usual repair shop.

Building cars in quantity as he does, the car builder can afford to keep in touch with improvements in design and in methods of manufacture. Some of his methods and equipment are patented and could not be used by the home builder. Where cars are built in considerable quantity at home, there is a tendency, almost overpowering, to cling to one design regardless of the progress in the art.

A railway company building its own cars is likely to be deceived as to the cost of the work. The chances are that not all elements of cost are included. Overhead charges are apt to be undervalued, especially when manufacturing is undertaken in a shop poorly adapted to the purpose. The rearrangements required, the attention given to the work by the higher officials not actually occupied with it, the extra accounting needed, the additional interest and insurance required—all these are essential elements of cost that are usually underestimated and often overlooked entirely.

Most serious of all, the time and attention of the officials in charge of the work, and the space in the shops, are diverted in part at least to the problem of car building instead of being concentrated on maintenance. Unless there is a separate organization and additional space equivalent to that which a car builder would need, maintenance is bound to suffer. The extra cost of maintenance and the loss of reliability of the service almost invariably far outweigh any economic gain to the railway. Experience has proved this to be so despite the best of intentions.

It should be remembered that the primary purpose of a railway is the safe and speedy operation of its cars. Anything which detracts from this is apt to be of very deceptive economy. Electric railway companies can well keep out of car building.

In Most Cities Electric Car Speed Can Be Increased Easily

FIGURES quoted in the discussion on traffic signals at the New York Electric Railway Association convention this week indicate that in congested traffic, electric cars make only half the speed of automobiles, largely because of the stops required to receive and discharge passengers. If the low speeds just quoted are true, it means that the cars miss practically every other "go" signal, and that any reasonable means for reducing the time spent at stops would greatly help the situation. It was during the discussion on this subject that H. N. Smith of the Municipal Bureau of Gas and Electricity, Syracuse, N. Y., made the very pertinent inquiry, why not more raised island platforms at car stops, and why not more skip stops?

As Mr. Smith pointed out, raised platforms when protected at the ends by bulwarks give a feeling of security to waiting and discharged passengers, which is not afforded by less permanent safety zones. They thus permit waiting patrons to be ready to board the car when it arrives, and they permit those leaving the car to remain in a safe place until they have a chance to reach the curb. Skip stops, he pointed out, while introduced during the war quite generally to economize fuel, should be equally useful in time of peace to economize time. In sections where streets are skipped, an electric car should be able to make as good time as the automobile, and so more nearly approximate its over-all speed.

There is no doubt that the low speed made by cars in congested streets is one of the most serious obstacles to economical operation, as well as a discouragement of patronage. Every effort should be made through rapid acceleration, rapid braking and short passenger stops to bring the schedule speed of the cars up to that of the other vehicles which use the street. Still another suggestion along these lines, that comes up from time to time though not brought out at the meeting, was whether the time had come to have electric cars stop at the far corner rather than at the near corner, at least in the congested districts.

Observations on a number of streets with manually controlled signals indicate the following situation: As the electric car approaches the near corner its further movement is prevented by automobiles on the track, as well as at the side, all waiting for the "go" signal. When this is given, the electric car is often in the middle of the block, and by the time it gets to the corner and receives and discharges its passengers the time for the green signal has passed, and the car must wait for another cycle. If this happens regularly, the car misses one signal at each corner. This may be the reason that the electric car makes only half the speed of the automobile on the same street, as quoted by one of the speakers at the New York meeting.

Assume, however, the far stop. The car, as before, waits for the green signal, perhaps midway in the block, because it cannot get nearer with automobiles on the track. When the green signal is given, the car makes the crossing with the group of automobiles accompanying it, and then stops and discharges its passengers at the far corner, preferably on a raised platform 20 or 30 ft. from the corner, rather than directly at it, so as not to be in the way of automobiles making the turn. It then proceeds as near to the next corner as possible to repeat the performance. While it may miss a traffic

cycle occasionally it does not seem that this should happen as frequently as with the near-side stop.

Conditions have changed entirely since the near-side stop became general some 25 years ago. Previous to that time the far stop was generally used, because the streets at that period were muddy and with the far stop the passengers could use the "cross walk" in passing between curb and rear platform. The main argument in favor of the near-side stop was that it would help to avoid collisions with vehicles crossing at right angles. At that time, of course, there were no traffic lights in use anywhere and very few traffic policemen. These arguments show what a tremendous change has taken place since the near-side stop was established. As regards city traffic, we are in a different age.

The far-side stop may not always be advisable, but it seems worth trying in congested streets. A distinctive stop sign, which should be put up anyway, would prevent any confusion on the part of waiting passengers.

Improvements in Equipment Permit Faster Schedules

SPEEDS of street cars, particularly in congested traffic, bear only a slight relation to the maximum speed which the motors can develop on a straightaway run. It has been pointed out many times that the schedule or average speed is determined to a great extent by the number of and time used in stops and the rates of acceleration and retardation. In other words, the car has so little opportunity to reach the maximum speed that its value is of little moment. On the contrary, with any given number of stops and standing time, the average speed will be greatest when the motors have the ability to start the car from rest and reach a reasonable speed in the shortest time, and the brakes have the ability to stop the car from this speed most rapidly.

Recent developments in equipment design have done a great deal to increase the possible acceleration and braking rates. Some of the results obtained were discussed in papers presented at the winter meeting of the New York Electric Railway Association. The new forms of drive with high reduction gearing have made possible the use of small, high-speed motors which still are able to accelerate the car more rapidly than has been practicable with the ordinary gear drive. In fact, tests have been made with one of the new types of drive that showed acceleration of 4.27 m.p.h. per second. This is far higher than anything used in practice, but indicates what can be done. Equally good results have been obtained with new types of brakes. Tests referred to by one of the speakers showed that from any initial speed of 20 m.p.h it was possible to reduce the stopping distance 40 ft. In schedules this works out to an increase in average speed of 6.4 per cent.

Apart from the ability to maintain faster schedules on a clear track, these improvements make it possible for the car not only to hold its place in the traffic line, but give it the ability to get away from a standstill faster than the average automobile, while being able to stop rapidly when necessary. To obtain the full advantage of these improvements requires skillful operators and good training; but these are necessities of present-day street railway service. Failure to take advantage of improvements such as these is likely to spell the doom of the non-progressive property.

Most People Are Fair When They Understand

The street railway business has put its worst difficulties behind. The industry now needs new confidence in itself and the courage to tell its story to the public

By Roland B. Woodward
General Secretary Rochester Chamber of Commerce,
Rochester, N. Y.

This article was the basis of an address by Mr. Woodward before the meeting of the New York Electric Railway Association held in New York City on Jan. 31. Coming as it does from a speaker representing the business man and car rider rather than the railway operator, it presents so complete a grasp of the railway situation in so forceful a manner as to commend it to every Journal reader.—Editor.

HEN the teacher asked the small boy what was the shape of the world, he pondered a moment and then replied, "Father says 'It's in a hell of a shape'." When anybody asks "What is the shape of the street railway business?" the common answer is similar. But the street railway business has passed the zero hour and is on the road to recovery. This recovery is not due to the fact that anybody likes the street car or wants the street car; but because at least four out of five need the street car and must have it to carry on from day to day.

The street car business has been the most maligned, condemned, abused and least appreciated and understood factor in our modern urban life. It has been the football of local politics, the source of unjust tax exactions, the object of unreasoning abuse. And the strange thing about it has been that the mass of the people, who must use it because they have no other means of transportation, have joined in the hue and cry and thought they were rendering a public service.

This is the strangest bit of civic crowd psychology 1 have seen in twenty years of experience in dealing with the public. Usually there is a crowd consciousness of identity with the thing they support and want and need. The baseball fans quickly espouse the cause of the home team though it may be made up of strangers from other They pay for the privilege of rooting for it whole-heartedly. The readers and followers of a given newspaper swallow much they don't like, but loyally stick to their favorite and pay for the privilege year after year. It becomes an authority to them and does much of their thinking for them. The employees of a great industry develop a mass loyalty to all the life of that industry and are proud of its progress. But the street railway industry, great as it is and necessary as it is in the life of any city, has been bled and abused and abused and bled while its millions of users have stood on

the side lines or have joined in the attack—not realizing that in the end they must pay the damages in poor rails, poor roadbed, poor cars, and inadequate service from an impoverished company.

I say the street car riders must pay in the end, though I know under a fixed fare plan how difficult it is to pass increased operating expenses on to the consumer. It is true that the stockholders suffer, but it may be that they can better afford to lose their money than the car users can afford to lose the service. But in most cases the stockholders won't lose because our communities are going to need mass transportation more and more as traffic conditions become more difficult.

MARKS FOR THE TAX COLLECTOR

Street car companies seem to have been shining marks for the tax collector. When they didn't make any money with which to pay taxes they took it out of their principal. The federal income tax, the state franchise tax on gross earnings, the municipal special franchise tax, and a few others add to their zest in making ends meet. But the most interesting one is inherited from the horse car days. Of course, the horses wore out the streets, to be sure not more than other horses, but these horses were especially attractive for taxation. The horses have long since passed away, but the tax is still with us. This tax, required by the state of New York from street railway companies, is unjust and indefensible. Without this burden the street railways are now taxed much more on their gross business than other utilities and nearly 80 per cent of every net dollar earned goes for taxes.

Chief Judge Cullen described the paving tax in his decision in the case of the City of Rochester vs. the Rochester Railway Company: "The tax," said Judge Cullen, "is paid in the form of paving and other materials for street construction. The materials which go into the paving are really purchased by the railway company and turned over to the municipality for the benefit of the community at large. The railroad derives no special or peculiar benefit from the construction of the paving; indeed it is a burden rather than a benefit."

That is carrying the taxing power pretty far. Let us see how it works. Nineteen feet width in a street with double tracks must be paved and kept paved by the street railway company. Who uses these 19 ft. of pavement?

Everybody—trucks, wagons, pleasure cars. Eighty-five per cent of the occupancy of the street for traffic and for parking is by vehicles, not street cars. In addition to paying for the 19 ft., the street car rider is a taxpayer. and certainly the street car company, which is one of the largest taxpayers, must pay its part in the proportion of

paving cost assessed against the city at large. This paving tax business goes further. Owners of property on a given street want it widened, or the city authorities want it graded or the development of a city plan requires that it be changed somehow to meet conditions in some other street. The owners and the car riders through their agency. the street railway company, are required to tear up good rails,

good ties, a good foundation and chip in tens of thousands of fares, which, perhaps, are needed for new rails elsewhere in the city, or for new cars, or for more frequent service, to pay for relaying of track and repaying 19 ft. This sort of thing has cost the Rochester railway lines approximately \$500,000 a year for several

It requires 50,000,000 fares in one year to pay the street railway companies' paving bill in New York State. The answer, of course, is that the street car rider doesn't know the load that is being put on his back. He doesn't know that in the end he will have to pay the bill somehow. Whenever government cripples a great public convenience or necessity by unjust taxation, by unjust restriction, or regulation, those who need and use that necessity suffer first, suffer most and suffer longest.

Though the users haven't fully sensed it, there is an identity of interest between the owners and users of any

wisely regulated public utility.

There is another group besides the street car riders vitally interested in the street railway problem. Good mass transportation is essential to urban life. This

means manufacturing and retail trade. Stop street car service or cripple it and tens of thousands find it difficult to get to work. Management and the owners of industry have a vital stake in good transportation for their workers. When the worker is handicapped by inadequate service his job suffers or he loses the job. Industry can't afford to have either happen. If the workman pays for something he doesn't get-in the end industry will have to help foot the bill. Good transportation is essential to the

worker and therefore to industry in our modern life. Large factory operation isn't possible without it. Mass transportation is a prerequisite of mass production.

FOUR OUT OF FIVE ARE CAR RIDERS

Large retail business can't live off automobile trade. If private automobiles monopolize our streets and slow up mass transportation or cripple it, the movement towards decentralization of retail trading will be accelerated. Probably four out of five retail customers are carried by street cars and not by automobiles. This consideration should not be overlooked when the retail merchant is importuned to use his influence to have the city set aside a third of the entire roadway for the storage, politely called parking, of private automobiles.

WHENEVER government cripples a great public convenience or necessity by unjust taxation. by unjust restriction, or regulation, those who need and use that necessity suffer first, suffer most and suffer longest.—ROLAND B. WOODWARD

tail customers are carried by

street cars and not by automobiles.

This consideration should not be

overlooked when the retail merchant

is importuned to use his influence to

have the city set aside a third of the

entire roadway for the storage, po-

litely called parking, of private auto-

mobiles.—ROLAND B. WOODWARD

The manufacturer and retailer have not taken any great interest in the problem of street car service. They have felt that it would work out its own solution. It probably will, but the solution of the problem would be speeded up if the manufacturers and merchants vitally affected would concern themselves to see that their employees and customers were given a service not handicapped

by unreasonable taxation, not slowed up by traffic con-

gestion or hampered by unwise regulation.

The street railway business must have had a naturally strong constitution. During my observation of twenty years, the street railway company in Rochester has submitted to a sufficient number of major operations to have put a less vigorous business under the sod. This vitally testifies to a public need. No substitute has been found. The increase of automobiles from 4,500,000 in 1917 to probably 24,000,000 in 1928 has checked the growth of mass transportation, but has also enlarged the riding habit from which the street car companies will eventually benefit. The fact that street cars represent only 15 per cent of the occupancy of the street, and at the same time carry 85 per cent of the people transported, justifies it as a necessity that must be given consideration in our increasing traffic problem.

Let me quote you from an address before the American Electric Railway Association by Sidney D. Waldon, president of the Rapid Transit Commission of Detroit:

then each pedestrian requiring 10 sq.ft. on the sidewalk, will, as a motorist, require 135 sq.ft. in the traffic space. Assuming that nothing but private passenger automobiles are to be used and that the full capacity of two 15-ft, sidewalks is to be halanced by a roadway of equal automobile capacity at two persons per car and there will be needed central traffic space of 198 ft. Adding two 8-ft. parking strips and two 15-ft. sidewalks would make up a total right-of-way of 244 ft.

On the other hand, passengers in bus, street car and rapid transit train occupy only 5 to 10 sq.ft., or reasonably comparable to the space requirements of the pedestrian. While the pedestrian and the street car passenger occupy about the same square

footage of street area as formerly, the average motorist requires 13½ times as much space as either. If, in providing for future transportation, the automobile is to be regarded as a permanent factor, then the old standards of street and highway width are obsolete, and new ones must be adopted.

The answer is not to be found in increased speed, for it has been demonstrated that as the speed increases the distance between vehicles must be increased for safe operation. A speed of 15 to 20 m.p.h. gives the maximum movement of traffic through any given traffic lane.

A pedestrian takes up about 10 sq.ft. A moving automobile, with a safe margin all around, occupies 270 sq.ft. Assuming an average of two persons per vehicle, ROBABLY four out of five reTHE street railway companies need a back log of informed

public opinion, especially on the part

of the car riders . . . Tell the car

riders the things they want to know.

Then you won't have to spend so

—ROLAND B. WOODWARD

much time on public officials.

To provide road area to accommodate the ever-increasing demands or needs of the motorist is beyond the financial ability of any city. The cost would be staggering, so if increased transportation is required it must be mass transportation, bus, street car or rapid transit, overhead or underground.

The natural course of events is quite clear. Students of urban traffic problems are turning to several obvious things. First, increasing restrictions on the use of the roadway, especially in congested districts, for the storage or parking of privately owned automobiles used for the transportation of persons. Second, the routing of privately owned automobiles used for passengers (not freight) so that they will not interfere unduly with mass transportation. Third, creation of new roadways and widening and extension of others without street car

tracks for use of privately owned automobiles where the cost of such improvement is not

prohibitive.

All signs point to the need for more and better mass transportation. The much abused street car will be increasingly needed by the mass of the people. Its usefulness, its cheapness, its dependability has been amply demonstrated. Its need of flexibility is being met by the

use of buses. It is a natural monopoly and in its control, subject to proper regulation, should be all the mass transportation in its community because only in that way

can the community be best served.

As an instrument in community service it is not understood or appreciated by even business leaders whose employees and customers need and depend upon it daily. It has presented its worst side to the public. Its failures or shortcomings are before our eyes daily. Its difficulties are hidden and unknown. It is hard for a starving man or a starving business to have a best side. Only prosperous businesses are popular. A prosperous business can be fair, even generous to its workers, its customers, its stockholders. A hard-up business is usually in wrong with everybody.

The street car business has dealt fairly with its employees. Not only the hourly wages, but the "real" wages, the purchasing-power wages, have continually increased since 1922. The companies have managed to give fair service to their customers while fighting for a living fare.

The stockholders have been passed by, almost forgotten. The balance for dividends averaged for the country as a whole has been little more than one-half what the Supreme Court of the United States has declared is a fair return upon capital invested in public utilities.

As we consider ways and means of improving the status of the street railway companies so that they may give adequate service and earn a fair return for their stockholders, we are impressed that the part they play in the scheme of things in our daily life is not understood by people generally. When people are not up on a thing they are usually down on it. City officials and legislatures, as a rule, do what they think the people will approve. Now and then they put something over which they think the people won't know about, won't care about or won't clearly understand.

The street railway companies need a back log of informed public opinion, especially on the part of the car riders. The timid manager who grew up in the old school where everything was done quietly, where things were fixed up without public participation, is likely to shy off at the thought of building up public support, through publicity, for his program and policies.

But this plan has worked in every phase of our modern business life. Not many years ago advertising and publicity were left to the crooks and the fakers. Now the crooks and fakers are killed off by the advertising of legitimate business. Study the effects of the advertising of the General Electric Company, the American Telephone & Telegraph Company, the railroads, and notably some gas and electric companies.

Tell the car riders the things they ought to know.

Then you won't have to spend so much time on public

officials.

Your own employees should be enlightened supporters of your policies. They should be sound salesmen of the street railway companies' cause. My experience teaches me that they need education on this subject as much as the car riders do. The car rider often expects the impossible. If he knew the facts he might be a supporter

instead of a critic. Your employees may know the facts,

but rarely take the trouble to explain them.

You have few defenders or advocates because few know how to defend you or advocate your cause. There is more general ignorance about your business than about any conspicuous business in the community. I've never known a man who has investigated your problem who has not been soundly converted to your cause. He is invariably convinced that you are overtaxed, underpaid for what is expected of you and not appreciated as a factor in city development.

What you need is an Al Smith or a Will Hayes as president of a street railway extension university. It is not a job for a mechanic or a conductor; it's a job for a leader, an educator, who has insight into the human elements and courage which comes from the justice of his cause. Under such leadership a campaign of education could be conducted in every city of the state, a campaign that would change public opinion from a liability to an asset. Most people are fair when they understand, but exasperating when they don't understand.

During these lean years you have learned to live economically, learned to go without. This always chastens the spirit. Now you need new confidence, new public support and approval, new prosperity. You have passed the zero hour in the street railway business. The worst is behind you. Mass transportation, which you alone can give, will be more needed and demanded in the future.

If fares go too high the law of diminishing returns will probably operate to your disadvantage. Therefore, you must manage and operate your properties efficiently; you must be freed from unjust taxation; you must fight the cause of the car rider; you must educate the public: and finally you must remember that confidence in the public and courteous service to the public in turn builds up confidence in the company and consideration for its rights.

How a Small City Property Was Resuscitated

By the installation of improved cars, the use of merchandising methods and a slight increase in its fare, the Pueblo Electric Railway, which operates in a city of about 50,000 inhabitants, was saved from abandonment

N THESE days of intensive automobile competition some electric railways conducting purely a local business in small cities have had to abandon their track. There was no doubt in most, if not all instances, that they were performing a needed public service to a large proportion of the community, but with increased costs, restricted fares and no gain in passengers they were unable to make both ends meet. Experience of the Southern Colorado Power Company, which operates the Pueblo traction system, shows that even for railways in cities of from 50,000 to 60,000 there is hope. By co-operation with the public a program was adopted which saved the road for continued usefulness.

In 1920 the number of revenue passengers carried by the Pueblo line amounted to 9,201,474. By 1925 it had decreased to 6,947,494, a loss of 24 per cent in five years. In November, 1919, the fare was increased from 5 to 6 cents for three years and later the 6-cent fare was renewed for a like period but under conditions which provided it should revert to 5 cents in 1925. Birney one-man cars were in use on a few outside lines, but a city

ordinance provided that all other street cars should be operated by two men.

By the fall of 1925 it was obvious that radical steps would have to be taken to save the service and the following program was decided upon:

1. To ask for a change in the ordinance so as to permit one-man car operation in all parts of the city.

2. To obtain an increase in fare to at least 7 cents.

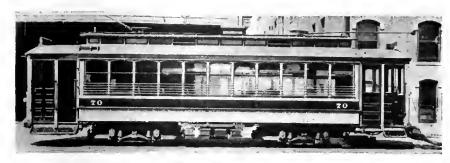
3. To remodel the double-truck two-man cars for one-man operation.

4. To increase the mechanical efficiency and speed of the cars, if possible; to improve their outside and inside appearance and make them more attractive and comfortable.

5. To apply merchandising methods to offset as far as it could be done the decrease in traffic due to the natural increase in automobiles.

6. To accomplish all these results without affecting adversely the existing good public relations and to increase the friendly relations of the public as much as possible.

It is not necessary to go into all of the details by which this program was carried out except to say that it was accomplished with the approval of the authorities and citizens of Pueblo. The results are shown in the de-



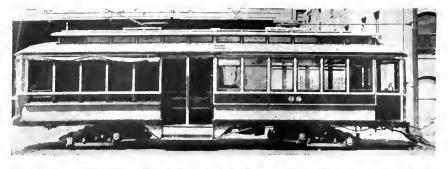


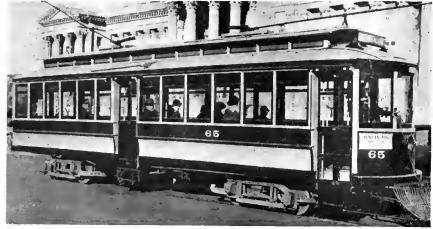
At top, 16-ton double-truck car with end entrances and exits before conversion Lower view, the same car after conversion for one-man operation

tailed report of the company for the year ended April 30, 1926 and 1927, given in the accompanying table. The purpose of this article is primarily to tell of some of the improvements and economies introduced, so that other companies similarly situated may understand the methods that have proved satisfactory in Pueblo.

Eleven of the 33 passenger cars of the company were of the standard Birney type. The 22 others were double-truck cars, sixteen with side entrance and exit and six with end entrance and exit.

During 1926 and up to July 1, 1927, nineteen of the two-man cars were remodeled to provide them with front entrances to fit them for one-man operation. They were equipped with the latest safety car control equipment, interlocked doors and steps, treadle-operated exit door, etc. While not all cars have been changed over yet, the rehabilitation mentioned represents 57 per cent of the passenger cars owned and 82 per cent of the passenger cars normally operated. Colored destination lights were used to indicate the three main routes operated.





At top, 16-ton, two-meter, double-truck car for two-man operation, as in use in 1925.

Lower view, the same car after conversion to one-man operation and equipment with four motors instead of two

The new rate of fare established by the ordinance secured was 7 cents cash and fifteen tokens for \$1. Continued effort was made to increase the sale of tokens, as using them in change meant a saving of time to the operator, as well as of money to the patrons. Arrangements were made with the drug stores to sell tokens

EARNINGS AND OPERATING EXPENSES OF PUEBLO RAILWAY SYSTEM, YEAR ENDED APRIL 30

SYSTEM, YEAR ENDED APRIL 30				
	1927	1926		
Passenger revenue, cash fares	\$396,594.68 50.00 47.45	\$397,560.41		
Miscenadeous transportation revenue	77.73	101.45		
Total earnings from transportation Earnings from other railway operation	\$396,692.13 2,011.10	\$397,398.98 1,983.32		
Total railway earnings	\$398,703.23	\$399,382.30		
Recapitulation of Expenses: Operation. Maintenance. Taxes.	\$197,366.31 77,762.19 46,927.14	\$222,543.61 75,953.21 51,423.01		
Total all expenses	\$322,055.64 76,647.59 80.8	\$349,919.83 49,462.47 87.6		
Operating Expenses: Superintendence of way and structures. Maintenance of track and roadway. Other maintenance of way Poles and fixtures Distribution system Buildings, fixtures and grounds.	\$1,953.45 20,111.74 169.38 2,243.93 3,284.82 442.67	\$1,820.00 24,113.78 830.75 1,049.08 2,909.45 0.87		
Total way and structure maintenance	\$28,205.99	\$30,723.93		
Superintendence of equipment. Cars. Electric equipment of cars. Miscellaneous equipment expense.	\$259.97 31,695.16 14,047.75 401.50	\$240, 24 28,299, 61 12,061, 67 1,321, 19		
Total conipment maintenance	\$46,404.38 19,971.02	\$41,922.71 20,768.07		
Superintendence of transportation. Passenger conductors, motormen, trainmen. Miscellanceous car service employees and expenses. Carhouse employees and expenses. Signal and telephone and telegraph systems. Other transportation expenses.	\$13,301.33 122,176.75 8,065.12 7,406.77 445.92 85.11	\$12,636.64 141,364.08 7,904.72 6,860.98 445.92 81.08		
Total expense conducting transportation. Total kilowatt-hour energy. Cost per kilowatt-hour.	\$151,481.00 4,823,548 \$0,414	\$169,293.42 4,529,474 \$0,459		

without extra charge, and a special campaign was carried on in which token holders were given free with each dollar's worth of tokens purchased. Full fares paid by tokens for the year ended April 30, 1927, showed an increase over that of the previous year of 116 per cent.

Newspaper advertising was used freely, advertising cards were carried in the interiors of the cars and the front dashers carried signs, usually with wording of a civic nature and some reference to the advantages of riding the cars.

Operators were instructed that they were primarily salesmen, selling rides to the public against keen competition of private automobiles. To avoid dissatisfaction among patrons who might pay their fares by inadvertently dropping more coins in the fare box than necessary, the operators have been provided with excess fare slips. These carry a notice that the operator himself cannot return the excess money, as it would make him short with his fare box, but the slip can be presented at the office and the excess money will be returned. The operator punches a number on the

slip indicating the number of cents overpaid and signs his name to it.

During the 1926 State Fair, which was held in Pueblo, the company entered a float representing street car transportation and received the third prize awarded.

Among the methods of improved maintenance in rolling stock adopted were the following:

Overhauling car bodies, trucks and motors on a mileage basis. Turning axle bearings from individual fit to the axles, which gives perfect gear and pinion clearance and greatly reduces the noise.

Keeping each pinion paired with its gear for the life of the pinion.

Swedging worn carbon brush-holder boxes to restore the brush clearance to standard.

Replacing old type brush-holder springs with new type.

Making new field coils of flat copper to replace the old type wound with round wire.

Installing spring cushions between field coils and motor bearings to keep the field coil from vibrating and to take up any shrinkage of the coil which may occur.

Pit grinding of flat wheels.

Hot dipping and baking of all armatures during regular overhaul; also rebanding and building up between armature coil and band of all armatures showing any looseness of the band.

Hot dipping of all newly rewound armatures and temporary banding while hot with wood strips between the coil and the temporary bands, then baking and permanent banding.

In its track maintenance, it has developed an ingenious method which has afforded considerable saving. When a rail joint gets low there is always a certain amount of wear on one end of the angle bars and formerly these bars were discarded. Now the joint is raised to a level and the worn part calipered and built up by means of the electric welder. Then it is ground to a perfect fit and the old angle bars replaced.

The company has found this method better than using new angle bars because it is possible to adjust the fill and grind both the rail and angle bar, thus making a fit far better than if the old angle bar was replaced with a

new one.

While the passenger revenue in 1927 showed a slight falling off from that in 1926, the outlook is that the street railway will be called upon to provide greater service than in the past to the public. This is not only because of the constant growth of the city, but because increasing street congestion has emphasized the need of restrictive ordinances on parking in the downtown streets. An ordinance recently passed on this subject provides no parking in the downtown section along any one block in which a street car makes a regular stop, and parking in the other downtown districts, including side streets, will be limited to one hour. Formerly, parking was practically unrestricted.

Small Property Perfects Safety Methods

Tide Water Company of Wilmington, N. C., has won two prizes for excellence in safety precautions. Its methods are detailed

IT WAS not through a spasmodic effort that the Tide Water Power Company of Wilmington, N. C., earned the Anthony N. Brady medal given in January for notable progress in safety and sanitation by railway companies operating less than 1,000,000 car-miles per year. The company has a long and consistent record of safety effort. In fact, it was the winner of the Fitkin railway safety trophy in the safety contest conducted in Sept. 1926. This contest was open to all of the National Public Service Company's railway properties.

The Tide Water Power Company and its subsidiary, the Coast City Transit Company, operated a total of only 959,119 vehicle-miles during the year ended Dec. 31, 1926. The Tide Water Company owns 33.6 miles of single and double track in Wilmington, N. C., and vicinity. It also owns an 11-mile suburban line serving Wrightsville Beach and intervening territory from Wilmington. Passenger service in the city is given entirely by safety cars. The Coast City Transit Company operates bus lines and feeders to the car service from the outskirts of the city.

The suburban line has a decidedly seasonal traffic. In the summer 22 large double-truck cars are required to carry the enormous number of excursionists, whereas during the off season three cars are sufficient. Summer also brings a tremendous increase in freight, express, car load and package shipments. New men must be trained each spring in advance of the season, so that ample and safe transportation may be assured. All this means, necessarily, that there will be a considerable increase in the number of accidents.

On the other hand, its ownership at the beach of a large bathing pavillion has brought the company in contact with life saving methods. Life guards are employed there, and life saving demonstrations are held on the beach at regular intervals. Company employees have also made a study of the prone pressure method of resuscitation. Two hospitals in Wilmington have requested a demonstration of this method by the company's men before their doctors and nurses. Incidentally, the company's general manager was elected chairman of the committee on first aid in life saving for the Wilmington Section of the Red Cross. Besides instructing every employee in the prone pressure method, the company has an inhalator and an approved gas mask as additional

aid in resuscitation and rescue work. This equipment is available night and day not only to all departments of the company, but to the public as well.

It would be impracticable to list all of the safety methods followed by the company, but a few resulting

from original ideas by employees follow:

1. Placing of "no parking" signs on company property along the right of way to reduce the possibility of accidents with automobiles.

2. Placing of crossing signs, warning both trainmen

and public of dangerous points.

3. Removal of nails and tacks from all working poles on the company's system, and the taking of proper steps to prevent the use of the poles by sign posters.

4. Establishment of an electrical school of safety during the winter and spring. This was open to employees on their own time and was well attended.

5. Discouraging talking to motormen on the cars.

ESTABLISHMENT OF SAFETY COUNCIL

Safety activity on the Tide Water property heads up in the safety council, of which the general manager is chairman. The personnel of this committee, with the exception of the department heads, is changed yearly. The safety council meets monthly in the general manager's office. At these meetings each member is called on to report individually. Suggestions are received, discussed and acted upon. The accident record of the previous month is reviewed. Each accident is discussed in detail. The record is compared with that of other months. The trend from year to year is noted. Causes are examined carefully, and steps are initiated to prevent the recurrence of accidents.

Since the initiation of the safety suggestion plan in 1920, and up to Dec. 31, 1926, 606 safety suggestions were submitted. Nearly all of them were found feasible and put into effect.

At the close of these meetings an inspection committee is appointed from the men present and sent out to make a detailed inspection of the property. This committee submits its written report to the safety supervisor. Suggestions supplied by the men are included in the report. The trainmen have become so interested in the safety work that they take up safety questions in sessions of their union.

Bonus Plan in Force

A bonus plan rewards trainmen for safe operation. The rewards are made on a monthly, quarterly and yearly basis. Many of the men have made perfect records and secured the maximum reward for as many as three consecutive years. Thus, in 1926, of the 48 trainmen eligible, 30 per cent held perfect records. In other words, during the year, they operated cars over the system without a single accident charged against them. Only one man on the staff failed to receive some award.

The bonus plan also extends to the bus drivers and to the regular drivers of all of the company's autos and trucks. The bonus schedule follows:

If an employee has an accident, he loses his cumulative bonus but can start over again for the rest of the year

Total\$21 possible in year

The cost of the bonus system during 1926 was \$516, or about 1 per cent of the wages paid to the trainmen

Pittsburgh Protects Passengers and Pedestrians

Railway adopts railed safety zones, extensive system of pavement marking and other means for reducing accidents to patrons and other users of the street

ON THE Pittsburgh Railways the campaign for safety is regarded as of the greatest importance. With the reorganization of the company a safety committee was formed to head up the movement, and a great many steps have been taken to reduce street accidents. Roughly, they may be divided into improvements on the car to make it more conspicuous and easily controlled, protection for boarding and alighting passengers, warnings on the street of dangerous points because of the operation of cars, and improvements in the track from a safety standpoint.

Many of these improvements on the cars were possible because during 1924, 1925 and 1926 many old cars were retired and new cars purchased. As these new cars were equipped with modern brakes and were up to date in other respects only what might be called the more unusual safety precautions will be mentioned here.

One of these was the selection for the car body of a light color, chrome-orange, instead of maroon or dark red, in order to give greater visibility. Stop lights were installed on the rears of all cars, operating from the control mechanism, so that when the car was slowing down preparatory to making a stop, the stop light was illuminated. Projecting fenders were replaced with automatic life guards. Window wipers were installed as were also rear sanders so that the motorman could sand the rails in case his car should begin to slide backward on a heavy grade. All controllers were fitted with a dead-man's attachment. When emergency stops are made, the doors of the car are automatically opened. This tends to reduce to a minimum the confusion of passengers in the event of a collision. The air brake handle has been



The distance taken by car overhangs on curves with a short radius is marked distinctly on the pavement

fitted with a device by which the operator can sand rails and apply air without removing his hand from the air brake handle. The pet-cocks on all air reservoirs have been changed so that they can easily be opened or closed from the outside edge of the car by means of a handle and cannot be opened accidentally. Automatic air brakes are applied to trailers.



This type of loading platform is used in Pittsburgh where the street is of sufficient width

The precautions for boarding and alighting passengers consist largely of island platforms which have been introduced at a number of points. Where the street is of sufficient width, a special railed platform or guarded safety zone of the type shown in an accompanying illustration, has been installed.

On two routes, there were points where there was a possibility of passengers alighting from cars and stepping directly into the path of moving vehicles on a high-speed thoroughfare parallel to the track. In one such case platforms were constructed so that passengers could alight from what would ordinarily be the wrong side of the car in order to keep them off the highway. In another case, the company has approved plans for shifting the track at stopping points so as to provide room for loading and unloading platforms.

loading and unloading platforms.

At locations where hazards exist from the overhang of cars passing around curves, the company co-operates with the city in painting the pavement so as to indicate the extent of the overhang. This work is performed under the jurisdiction of the traffic department of the city, the company assuming the expense incidental to the employment of one painter. At dangerous car turns, a warning is painted on the street, "Watch Car Turn."

At a few points within the city where the car platforms formerly overhung the curb when the car was passing around the curve, permission was secured to cut back the curb so as to reduce the possibility of pedestrians being struck by the car. On interurban lines obstructions to vision at road crossings have been cleared away so far as was possible. The attempt has been made to give a clear view to an approaching vehicle from a point approximately 40 ft. from the car tracks and to a street car operator 400 ft. from road crossings. Where necessary, the purchase of property has been authorized to attain this result. Up to 1926 four such locations had been remedied. Block signals and automatic crossing signals have been introduced to a considerable extent on the interurban lines.

In the track the principal safety precautions have been positive-locking electric track switches and electrically operated derail switches at railroad crossings.

An article in regard to the latter appeared in the issue of ELECTRIC RAILWAY JOURNAL for June 27, 1925, page 1008. Since that time the use of these derail switches has been extended.

The purpose of the addition of the locking feature to the electric switch is to prevent "switch-splitting" during the movement of a car over the switch. It has proved successful.

Single-Phase Equipment

for New York, Westchester & Boston Railroad

Extension of the company's lines and increased traffic resulted in order for 30 additional cars

By Walter H. Smith

Equipment Engineer Reading Railroad*





INCREASE in passenger traffic and extension of lines made necessary the purchase of additional equipment by the New York, Westchester & Boston Railroad, New York, N. Y. Recently three orders were placed, each for ten cars, making a total of 30. When these are all received the company will have 80 all-steel passenger motor cars and five all-steel trailer cars.

The road is a four-track line starting from the Harlem River in New York City and continuing north to just beyond Mount Vernon where it diverges into two double-track lines, the one on the west

continuing to White Plains while that on the east is now being extended from Mamaroneck through Harrison to Rye. Further extension to Port Chester is contemplated in the near future. The system at present comprises 26.62 route-miles with a total of 83.10 miles of electrified track.

Following previous practice each of the new cars has

*Formerly railway equipment engineer Westinghouse Electric & Manufacturing Company.



One of the latest New York, Westchester & Boston Railroad cars

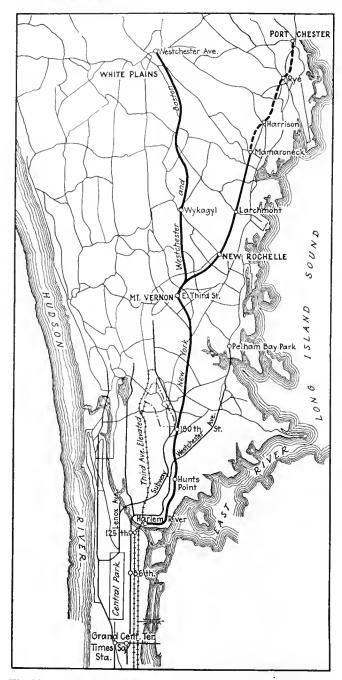
The train line and bus line receptacles may be seen in the end view directly beneath the body and inside the step line. The interior is roomy and cheerful, cross seats being used except adjacent to the door. Flush platforms are the rule except at a few little-used stations.

two 175-hp. (hour rating) Westinghouse type 409-B single-phase, 25-cycle series motors mounted on one The Westinghouse type AB (automatic acceleration, battery operated) multiple-unit control system is used, permitting a train of from two to ten cars to be operated from the master controller of any car. Usually trains consist of motor cars only, but, occasionally, during rush hours, a train of six or more cars may include one trailer.

Each car is equipped for double-end operation and each motor car has two pantographs of the sliding shoe

contact type, raised by a spring and lowered by air. There is a self-adjusting action so that the shoe moves to conform to the lowest trolley wire height. Each pantograph will collect current from the trolley at 11,000 volts and is suitable for speeds up to 60 m.p.h. The gears are of the flexible type with a 25:68 ratio.

The new cars are designed to operate in multiple with those in service although the main power circuit requires only six unit switches arranged for preventive coil transi-



The New York, Westchester & Boston lines run from the Harlem River to White Plains and Mamaroneck, an extension being made to Port Chester

tion, whereas the power circuit on the old cars requires eight unit switches with grid resistor transition. Any two cars with different systems of control may be operated in multiple if designed for the same rate of acceleration and placed under the control of a motor current limiting relay, provided that the tractive efforts in pounds per ton at the rims of the driving wheels are approximately equal, the free running speeds are equal when the motor performance curves are reached, and the balancing speeds are equal on level tangent track. These conditions are met as the old and new cars weigh practically the same and the motors are duplicates electrically.

The high-tension cable on the roof of the car is carried on porcelain insulators. The cable leading to the main transformer is run in a metal conduit and is entirely enclosed from the roof to the casing of the transformer.

The main transformer is of the two-circuit, air-blast

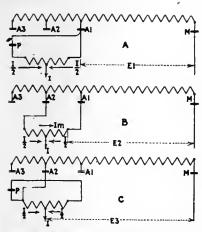
type. The primary winding is connected between the pantograph and the track rails and the secondary winding has suitable taps to give the required voltages for traction motors and auxiliary equipment.

Around the cable leading from the pantograph to the primary winding is a small series transformer, the secondary of which connects to the coil of a relay which will energize the actuating coils of the pantograph "down" magnet valves, if there is excessive current in the trollev cable such as would be caused by a short-circuit or ground. Then the pantograph on the affected car will be lowered automatically after power has been cut off from the line by the opening of the transformer station breakers. The relay disconnects the "trolley-down" magnet coils from the control train line and energizes them directly from the storage battery which makes it impossible to raise the pantographs again until the relay is reset manually to its normal position. The relay does not operate under normal overload conditions. function is to clear the line after a break-down has

The main power circuit requires but a single preventive coil for transition from one tap on the transformer to another during acceleration. The coil consists of a laminated, iron structure assembled around a winding and clamped between cast end frames. Its middle point connects to the traction motor circuit and the end leads connect through the switch group to points on the secondary winding of the main transformer. It is possible to secure five accelerating points with four unit switches. The circuits are so arranged that each half of the preventive coil is required to carry one motor current on all accelerating and running points. In the accompanying partial schematic diagram showing switches M, A1 and Pclosed on the first point it will be seen that the current is divided equally between the two halves of the preventive coil, neutralizing any choking effect. This connection will give a voltage on the motors from M to A1 on the transformer. If the current at start is I, then the current in each half of the coil will be I/2 with no magnetizing current in the coil and consequently no iron loss.

In switching from one point to another, acceleration switch P in Section A of the diagram must be opened before switch A2 in Section B is closed. During the time from the opening of P until the closing of A2, the entire motor current must pass through one side of the coil only, and unless the coil is properly designed there may he a considerable choking effect. A properly designed coil, however, minimizes the choking and since the changing of switches may be made to take place in some four cycles the effect is negligible. In passing to this second point with switches M A1, and A2 closed, the voltage across the motors will be M-A1 plus one-half A1-A2. The current in each half of the coil will still be I/2, but superimposed on these two currents on this point is the magnetizing current I_m of the coil necessary to produce a voltage equal to that between the transformer taps A1 and A2.

It will be seen in passing to the third point, shown in Section C of the diagram, that it first will be necessary to open switch A1 before reclosing P for the second time. While this switching is taking place the entire motor current again must pass through one-half of the coil for an instant, after which the current in each half of the coil will be one-half with no magnetizing current. The voltage on the motors on the third point will be MA2. The transition to other points is a repetition of the above. On the fifth or final running point there



Partial schematic diagram of power circuit, showing use of the preventive coil

is no magnetizing current in the preventive coil. This arrangement provides maximum efficiency during both acceleration and running. The six electro-pneumatically operated unit switches required are assembled in a group on a common frame enclosed by sheet metal covers. The individual switches. blowout coils, actuating air cylinders

and magnet valve brackets may be removed independently. Included with the switch group and mounted on the end frames are one sequence switch, one current limit accelerating relay, two overload relays, and two individual motor control cutout switches.

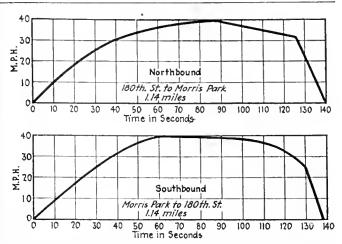
The current limit relay determines the rate of acceleration of the car. It controls the movement of the sequence switch drum which, in turn, regulates the closing and opening of the individual switches for proper acceleration. The rate of acceleration may be changed by changing the relay setting.

Incorporated with the current limit relay is also a shunt coil which, if energized by cutting out either of the traction motors, automatically gives a reduced relay setting and the car may proceed with the remaining motor but with reduced acceleration.

The sequence switch controls the closing and opening of the unit switches in the proper order for acceleration. It also makes possible positive interlocking of the control system used on these new equipments, which provides against closing of two conflicting switches at the same time. The closing circuit of the incoming switch is interlocked through the "out" position of the outgoing switch, as distinguished from negative interlocking in which the holding circuit for the outgoing switch is opened by an interlock in the "in" position of the incoming switch.

REVERSALS INTERLOCKED

The single reverser is interlocked with the power circuit so that the switches cannot be closed and power applied to the main motors unless it is in its correct forward or reverse position as indicated by the master controller. It also cannot be thrown while power is on the motors. The reversing drum is rotated by two air cylin-



Typical speed-time curves, showing performance of the cars between Morris Park and 180th Street in both directions

ders, compressed air being admitted to either the "forward" or the "reverse" cylinder by two magnet valves. The reverser is suspended from the underframing of the car body between the switch group and motor truck so as to provide for the least amount of cable wiring for the main motor circuits.

Each car has two drum-type master controllers, one at each end. Moving the handle to the right causes a forward movement of the car and moving it to the left a reverse movement. If the motorman's hand is removed for any cause the handle will return to the "off" position and cut off power.

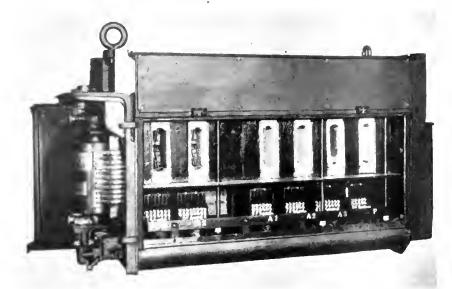
Each controller also has a control cutout and reset receptacle. The drum for actuating the control trainline wires cannot be energized unless the cutout plug is inserted in the receptacle. This plug cutout is also used for resetting the overload relays through the reset receptacle.

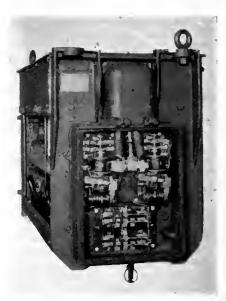
Two push buttons in each master controller actuate magnet valves which govern the admission of compressed air to the cylinders which unlock the pantograph and allow it to be raised to, or lowered from, the running position. The unlocking button has an automatic release, but the lowering button will remain closed until released manually.

The control and air brake train-line circuits between cars are made by jumpers and two twelve-point receptacles mounted at each end of the car. This permits coupling of the train line from either side of the car and without regard to ends. All of the control train line wires are run in one conduit. Three junction boxes provide for the train line and for connections to the individual pieces of apparatus. The train line jumpers are carried in dummy receptacles when not in use.

Energy for operating the magnet valves of the control







The main switch control group, with the sequence switch and limit relay at the left end. The view at the right shows the overload telay and motor control cutout switches, which are mounted at the opposite end of the main switch group

apparatus, the air brake apparatus and the emergency lighting system is taken from a motor-generator set and storage battery at from 32 to 40 volts. The storage battery consists of 25 cells of the Edison B-2-H type connected in series and floating across the motor-generator set when it is running. The battery is rated at $37\frac{1}{2}$ ampere-hours at its normal rate of discharge.

The motor-generator is semi-enclosed, self-ventilated, and equipped with two ball bearings. The motor is a two-pole, three-phase induction type with a cage rotor, which operates at 110 volts on a single phase. The set is brought up to speed automatically from the d.c. end with current from the storage battery. The generator is a four-pole, shunt-wound machine with two brush arms. A suitable rheostat adjusts the field excitation to give proper voltage on the battery and other apparatus. A battery cutout relay energized from the motor circuit connects the battery to the generator when the transformer is alive and the motor-generator cutout switch is

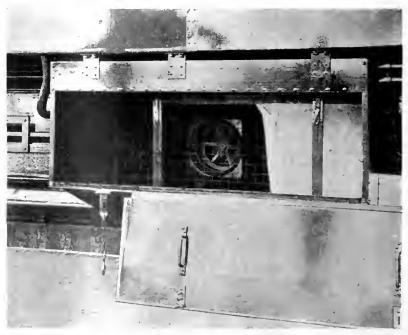
closed. It also disconnects the battery from the generator upon loss of line potential, lowering of the pantograph or cutting out of the motor-generator set.

DUPLICATE LIGHTING SYSTEMS INSTALLED

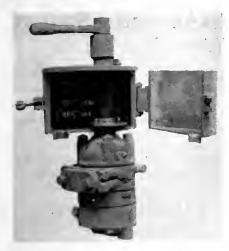
The lighting system of the car consists of ten main lamps and ten emergency ones alternating in one row in the center of the car. The main lamps are on a 110-volt circuit supplied from the main transformer, while the emergency lamps operate on the battery at from 32 to 40 volts. The emergency lamps are cut in automatically upon loss of line potential. In addition, each end of the car has two vestibule lamps, two marker lamps, one gage lamp, one headlight, and one car number lamp. All of these are fed from the motor-generator and storage battery.

The ventilating system for the equipment consists of a single inlet over-shot wheel blower, driven by a single-phase series type motor. The wheel is a 15-in., 1,500-





The control compartment of the car indicates the simplicity of the equipment which the motorman must handle. At the right is shown the air intake to the ventilating system. The snow screen is partlyin place



The electromagnetic brake valve. The cover derside of the is opened to show the control contacts channel box cen-

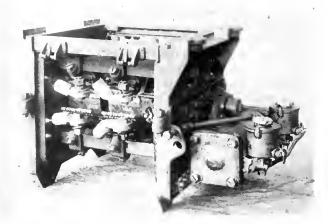
r.p.m. Sirocco runner. blower unit is behind the main transformer toward the trailer truck. The intake is a large sheet metal box on the underside of the car body. It has a snow barrier which is readily thrown in place. The blower wheel casing is bolted to the unchannel box center-sill of the car

body. The ventilating air to the transformer is blown directly into the transformer casing, while that for the motors is transmitted through the center sill to the motor truck where there are outlets to the motors. These outlets are provided with curved deflectors. The connection from the center sill to the motors is made by means of flexible oil-treated canvas bellows suitable to allow for the maximum truck swing. The ventilating air to the preventive coil is taken from the center sill.

Length over coupler faces.	72 ft 03 in
Length over buffer face plates	
Length over body corner posts	
Length center to center of trucks	
Wheelbase	8 ft. 0 in.
Wheel diameter (motor truck)	42 in.
Width over side plates	9 ft. 71 in.
Height of car from top of rail to top of roof	
Seating capacity	80
Weight fully equipped.	125,000 lb.

The cars are all steel with full vestibule platforms and center side doors. Flush type station platforms are used on this road, but in order to permit the cars to be operated over a section of the New York, New Haven and Hartford Railroad with low station platforms, the usual coach type steps with trap doors are installed at the ends. Some of the principal dimensions of the new motor cars are given in the table above.

The body underframe consists of continuous rolled steel channels and pressed steel cross members. The center sills are two 8-in., $16\frac{1}{4}$ -lb. channels spaced 14 in. back to back and having a continuous top cover plate securely riveted in place. A bottom cover plate extending from the blower unit to the motor truck completes the ventilating duct to the traction motors.



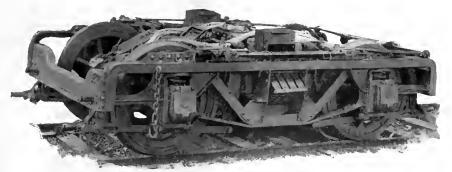
The reverser is air operated and changes all circuits for reversal of motion

Each side sill is a 7-in., 12¼-lb., rolled channel. The vestibule end sills are formed of pressed and rolled members with a ¼-in. cover plate, riveted together and also to the center sills. The body end sills are pressed steel members framed to center and side sills and with both top and bottom cover plates. Single and double cross bearers of pressed flanged diaphragms with cover plates are riveted to the center and side sills. The diaphragms are perforated for air piping and conduit. The diagonal bracings are pressed and rolled members riveted to gusset plates framed to the center and side sills at various points. The body bolster is composed of pressed flanged diaphragm and top and bottom cover plates. A cast steel filler is fitted and riveted between the center sill channels to support the center plate.

The side frame of the car is in the form of an elevenpanel truss, 7 ft., $5\frac{1}{4}$ in. in height. The bottom member is a 7-in., $12\frac{1}{4}$ -lb., rolled channel. The posts, diagonals, letter board, and top plates of each section are pressed in one piece and the different sections are either welded or riveted together. Channel shaped window posts extend from side sill to deck sill. The side sills and side plates are reinforced across the door opening by special pressed members. There are twenty intermediate posts of pressed steel, which extend from side sills to side plates. The main posts and diagonal braces are riveted to the 7-in. channel side sill.

·THE AUXILIARY EQUIPMENT

All the doors are of the sliding type. The vestibule and center side doors are remotely controlled, being opened and closed by National Pneumatic Company. Type GS-8E air engines. The center side doors may be opened and closed from either end of the car. The control



This view of the truck shows the extreme compactness of the installation. The truck at the opposite end of the car is a trailer

circuits of these two doors are also provided with a pushbutton switch which permits them to be closed by guards standing on the station platforms.

Each car has ten ventilators, located in the roof in two rows. The car heating system consists of 36 Gold Car Heating Company type 405-E, 600-watt, cross-seat electric heaters and two 1,000-watt vestibule heaters. The heaters are of the two-coil type, the main car heaters having one coil with 200-watts capacity and one coil with 400-watts capacity. Nine heater coils are connected in a series. Energy for heating is supplied from the main transformer at 112 volts and is controlled by cutout switches located in a cabinet provided at the motor truck end of the car for the control switches and fuses of all auxiliary apparatus. Each car also has a two-circuit bus line for supplying energy for heating and lighting when the service requires trail car operation.

The brake equipment is the Westinghouse Air Brake electro-pneumatic, schedule AMCE. Brake action is positive at all times, for if the electric control fails the pneumatic control functions without further direction on the part of the operator. Electric control effects an economy in air consumption, necessitating only a comparatively small compressor. The compressor is the XD-2-EG, having a displacement of 25 cu.ft. per minute. The motor is supplied with current from the main transformer at 112 volts. The system is synchronized, so that in train operation each compressor performs an equal share in the work.

The control valve embodies all the modern operating features, chief of which are quick recharge of the brake system, high pressure in emergency, positive and uniform service action and simplicity of control. The control valve automatically performs these functions under the simple guidance of the brake valve, which is a standard rotary valve type with the addition of a suitable electric portion.

\$1,000 Erects Attractive Station at Little Rock

FOR the convenience of passengers at the Rock Island railroad station at Little Rock, Ark., and the people living and working in the vicinity of that station, the Arkansas Power & Light Company has built a combination waiting room and news-stand at the end of its Rock Island street car line. It is the first of several stations of that type which the company plans to build in the loops of other lines. The construction cost was approximately \$1,000.

The station is of stucco and frame and is simple but artistic in design. It measures 6x12 ft. and is approximately 15 ft. high. It has a concrete base 16x22 ft. On the exterior of the building there is a sales booth which has been leased as a newsstand for \$15 per month, which is regarded as a satisfactory return on the investment. However, in making the agreement, the company provided that the tenant's first duty was that of service to the company and that he should act as its passenger agent at that point. This means that he must be informed on the railway schedules and be courteous to all patrons of the line, as well as sell tokens at the usual rates. He is permitted to store baggage, for which a nominal fee may be collected.

Seats are placed at either end of the building for the comfort of waiting passengers. The waiting room furnishes protection from the weather for passengers, who formerly waited at the railroad station across the street and then were forced to run to catch the car or else take chances on getting wet in bad weather.

The building is situated on the east side of a loop and the cars stop at the end of the waiting room so that passengers may board or leave the car with the least possible exposure to the weather.



The first of a series of combined waiting room and news-stands, erected at the end of an important line by the Little Rock company

Maintenance Methods and Devices

Oil Is Superior to Grease for Gear Lubrication

By H. S. WILLIAMS

Assistant Superintendent of Equipment
Department of Street Railways,
Detroit, Michigan

MUCH attention has been given to the subject of gear lubrication and the question as to which is the better medium, an adherent or tacky type of grease or an oil. The present construction of gear cases is such that oil cannot be retained as a lubricant. In fact, it is often difficult to prevent the loss of heavy greases. However, the incentive toward developing an oil-tight gear case depends on whether the oil used is superior to grease for this type of lubrication.

With the idea of determining which lubricant is superior for ordinary spur gearing of railway motors some tests were made. Having the test apparatus at hand that was used for the noise reduction committee's study, it was easy to run a series of tests to determine whether there is any difference in the resulting efficiency when grease or oil is used for railway gearing. The test consisted

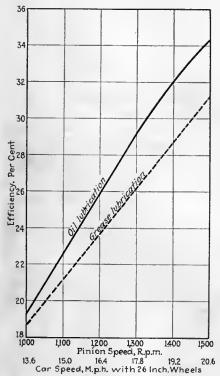


Fig. 1—Temperature rise of gear with oil 5.83 deg. C. With grease 10.35 deg. C. Time for each temperature test 50 minutes.

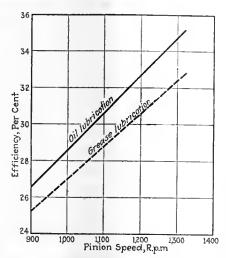


Fig. 2—Comparison of efficiency at different speeds for oil and grease lubrication.

of driving a generator by means of a motor. By measuring the input and output at various speeds, the efficiency was obtained. The efficiencies shown are very low as the generator used was of ancient type. The test was run first with grease, then the gearing was cleaned and the test repeated with oil. The results obtained are thus comparable, as all other conditions except lubricants were identical.

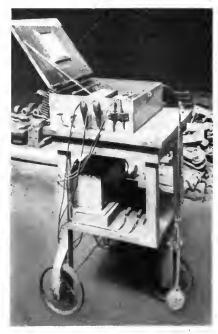
The accompanying graphs show the results. A first test, shown in Fig. 1, was quite conclusive, but desiring to be absolutely sure it was decided to run a check test. In the second test the generator was replaced with another type, so the over-all efficiency is not the same as in the first, but the relative results are similar. Attention is also called to the corroborative evidence given by the temperature rise that was obtained in the first test.

From these tests I believe that proof is established that oil is much the superior type of lubricant. It is a simple matter to figure back from these data and see approximately what it costs to stick to grease as a lubricating medium. The word "approximately" is used advisedly because, as pointed out before, the present gear case invites the entrance of grit and dirt, so if energy loss is figured correctly there is still the element of gear life to be added.

It is my firm belief that gear cases of the future must be made oil tight. With the present tendency toward new design of motors, this can be accomplished quite readily.

Portable Electrical Testing Machine

POUR portable testing machines mounted on rubber-tired wheels are used by the Georgia Power Company, Atlanta, Ga., for detecting poor connections, improper winding of fields or short-circuited turns and to determine which fields need to be removed and repaired. This testing machine, which was described in the brief of the company submitted in competition for the Coffin Award, has proved of great value in reducing detentions to service and increasing the efficiency of the electrical equipment. Necessary parts are mounted



Field testing equipment

on two platforms of the framework. Covers provide easy access, while they protect the equipment and keep it dust-proof.

This machine has been a large factor in reducing armature and field troubles. The following information shows some of the beneficial results:

Location of trouble	1922	1923	1924	1925	1926	First Four Months 1927
Armature	260	280	187	147	64	17
Field	141	98	85	75	23	

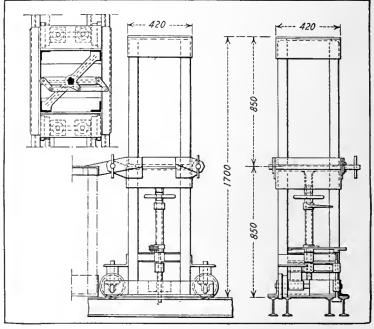
Support for Car Ends in Overhaul Shop

SUPPORTS of an ingenious type axles the latter are set in eccentrically for the ends of cars while they are arranged bearings so that when the being overhauled have been developed by the Elevated & Underground Railway of Berlin, Germany. A feature of the design is that there are no cross girders or braces between the two supports at each end of the car. Hence, there is no obstruction to prevent a workman from getting at any part of the underside of the Another feature is that each

support is in its proper position the wheels with their axles can be moved with a lever off the floor, allowing the support to rest solidly on the girder rails. It is then locked in this position by means of an inverted steel T-bar whose shank passes through the slot between the I-beams and engages on their underside. This T-bar is raised by means of the hand

it, the springs are compressed so far that the bottom of the support automatically comes to rest on the floor. The locking arrangement has also been simplified in that a lever half way up on the support is arranged to turn the inverted T-bar through an arc of 90 deg., and a spindle and hand wheel locks it against the under side of the I-beams. Still another change made is to build the support in two parts hinged together so that the upper part can be tilted over to allow the jack to support the car at





At left—This movable support can be locked in position and the weight taken off the wheels when it is used to support a car body.

At right, recent modifications in the same support, as developed by the Elevated & Underground Railway

of Berlin. The dimensions are in millimeters

corner support can easily be moved in the direction of the side sills of the car. This makes them very easily adjustable to various lengths of car, and when not in use they can be rolled back out of the way against the wall or center posts of the building.

The design shown in the accompanying half-tone was the form used at the time of the visit of a representative of the Electric Rail-WAY JOURNAL to the repair shop of the company during the latter part of May, 1927. As will be seen, the support is built of structural steel and is mounted on four small wheels which run on tracks extending from the side wall to a short distance under the car. The structure is 153 in. square and 5 ft. 7 in. high. The rails on which it runs are formed of two pairs of I-beams separated by a distance slightly more than the thickness of the wheel flange.

To prevent the heavy weight of the car from coming on the wheels and

the base of the support. The T-bar clamps the support rigidly in position. A wooden block is placed on the top between the support and the side sill of the car, as shown in the illustration.

Since the visit of a representative of this paper to the repair shop of the Elevated & Underground Railway in Berlin several improvements have been made in this jack, according to a recent issue of Verkehrstechnik. The improvements are protected by German patents. In this later design the lever for lifting the wheels and axles out of the way when weight is put on the support is eliminated. Instead, spiral springs are placed directly above the wheel journals in a closed cylinder. The strength of these springs is such that the weight of the support alone does not depress them appreciably; that is to say, the support alone can be moved freely on its wheels. If, however, the car weight rests upon

wheel shown in the illustration near a lower height. This is desirable for certain operations, like replacing the side panels.

Besides their use in the shops of the Elevated & Underground Railway in Berlin, the German State Railway has introduced these movable supports in its new shops in Niederschoneweide-Johannisthal, but has made a few changes in their design. To increase their stability, they have been made slightly trapezoidal in the direction of the car. Instead of spiral springs for allowing the support to come to rest on the floor when the weight of the car is put upon it, leaf springs are used, the two axles being attached to the ends of the springs and their middle points being attached to the support. When the support is loaded the springs become flattened, allowing the support to rest on the girders, as before. The locking arrangement is similar to that in the Elevated & Underground shops.

New Equipment Available

Heavy Type Electric Tractor

ODEL K24C tractor with four-Wheel drive has been brought out by the Yale & Towne Manufacturing Company, Stamford, Conn. The machine is capable of an ultimate drawbar pull in excess of 4,000 lb., depending on road surface conditions, and will operate at a continuous drawbar pull of 1,000 lb. without danger of overheating. By driving all four wheels of the machine, it is possible to get the maximum of traction with the given overall weight of the machine. feature is of particular advantage when the tractor is used to drive outdoors between buildings or where ice and snow are encountered.



New type of Yale electric tractor

The machine is fitted with fourwheel brakes, which operate through the differentials, so that they equalize properly regardless of the conditions of the lining. The spring, which automatically sets these brakes when the operator either releases the pedal or steps off the machine, is connected directly to the brake shoes so that any disarrangement of the linkages between the pedal and the brake lever would in no way hazard the driver of the machine. Should the linkage fail, the brakes would be set immediately and warn the driver that something is wrong.

The brake pedal is large, so that it is possible to rest both feet comfortably on it. The pedal lies flush with the wooden flooring of the tractor. By a suitable arrangement of toggle joints, the pressure required to start the pedal in the release or downward direction is greater than that which is required to hold it down once it has been depressed. To cut off power and apply the brakes, the pedal is allowed to rise. Should the operator leave his machine at any time or fall from it, the brakes would be set automatically.

Steering is through a rugged handle so arranged that it may be folded up out of the way if the driver wishes to leave the seat. Each of the steering knuckles on all four driving wheels is equipped with a ball thrust bearing which lightens the steering, permitting the driver to switch his machine quickly when in tight places.

The driving mechanism consists of two standardized units connected parallel to the controller. The machine is furnished regularly with a 48-volt motor and a 23 to 1 gear ratio. The frame is unique in that the pressed steel guide members or main supporting members are integral with the axle yokes. This gives the frame a depth of 18 in., making it fairly capable of standing jolts and jars in addition to the usual bending stresses to which it is subjected. The bumpers are made of $\frac{1}{2}$ -in. plates and a triple bumper casting front and rear gives a range of coupling heights that will meet practically every requirement.

Improved Cutting Blowpipe

OMPLETE assurance against backfire, even under the most severe operating conditions, is claimed for a cutting blowpipe, known as type C-14, which has been added to the line of the Oxweld Acetylene Company, New York, N. Y. blowpipe uses the same nozzles as the Oxweld type C-2, which it resembles; although several improvements in design have been made. The three gas tubes are straight, having no bends either outside or inside the handle. The cutting valve is of the same design as has been used on the type C-6 for many years and is now used on all hand-cutting blowpipes of the same make.

Some time ago the small needle valve bodies used for acetylene on the cutting blowpipes were improved by making them pressure forgings. Now, in addition to these, both the head and the rear body of the type C-14 are

pressure forgings, instead of plain castings, giving better appearance, increased durability and lessened weight.

Interchangeable nozzles are provided so that the blowpipe may be used with either medium or low pressure acetylene. Obviously the medium pressure nozzle cannot be used with low pressure acetylene, but the low pressure nozzle can be used with a medium pressure acetylene supply if low pressure is maintained in the hose and blowpipe. To accomplish this, the regulator should be adjusted to give a flame showing an excess acetylene cone not more than 1 in. long when the acetylene valve on the blowpipe is wide open. The acetylene valve should then be adjusted to obtain the neutral flame.

Light Steel Wheel

LIGHTNESS and strength are characteristics claimed for a new steel wheel for light trucks placed on the market by the Dayton Steel Foundry Company, Dayton, Ohio. It has the typical Dayton hollow-arch spoke construction, integral hub and felloe. It is cast in one piece from



Dayton light steel wheel

electric furnace steel. The spokes cannot loosen and flats, causing the wheel to wobble and decrease the life of the tire, will not develop. Metal is distributed so as to avoid localization of stresses. The wheels, cast in one piece, are machined at one set-up. Bearing bores, brake drum pilot and tread are concentric.



Oxweld type C-14 cutting blowpipe

Association Activities

Advantages of High-Speed Railway Motors*

By N. W. Storer Railway Engineer Westinghouse Electric & Manufacturing Company

SPEED is purely a relative matter. brush to jump or vibrate is likely to A motor in one generation may be cause flashing. One of the best safeconsidered high speed, while in another it would be low. The early doublereduction gear motors were dropped because they were of the bipolar type, were unprotected, and drove through poorlycut or uncut gears. The noise was in-The armatures were hand tolerable. wound and commutation was bad. single-reduction motor was radically different in almost every respect, having a slotted armature with form-wound coils, protected by the motor shell, and with only half as many gears.

Now, after an interval of nearly 40 years, we have the reappearance of the double-reduction gear in the form of a separate gear unit, the W-N drive, which permits a very high speed. The modern motor with single reduction and low wheels has about the same armature speed as the old double-reduction motors, so that the latest double reduction gives a speed unprecedented for street railway motors.

HIGH-SPEED MOTOR TROUBLES

The principal causes of trouble with the high-speed motors in the past have been commutation, broken armature leads, armature windings, rapid brush and brushholder wear, and short bearing life.

Bad commutation may be caused by poor compensation-the motor may be compensated for heavy loads and saturated fields as frequently happens in order to make a good showing on test. As a matter of fact, probably 90 per cent of the flashovers occur at high speed and light load. If the motor is fully compensated for heavy loads, it will be over-compensated at light loads when a very little sparking is likely to cause flashing. It should be compensated for higher speed and a little more sparking tolerated at heavy loads.

Flashing may also result at light loads. due to armature reaction causing a high distortion of the field under the pole pieces on account of the lack of saturation. Another fruitful source of flashing is poor brush contact between the brushes and the commutator resulting from rough commutator, bad track, worn gears and bearings, or unbalanced armatures. Anything that can cause a

*Abstract of a paper presented at the midwinter meeting of the New York Electric Railway Association, New York, N. Y., Jan. 31, 1928.

cause flashing. One of the best safe-guards against flashing due to brush jumping is to use four brush-holders.

OBTAINING GOOD COMMUTATION

Other things being equal, a larger number of commutator bars will cut down the maximum volts per bar and will help, if not accompanied by too narrow bars. The old standard street car motors with commutators 9 in. to 11 in. in diameter were comfortably rated at 600 volts. There was room for an adequate number of bars and for distance between brushes. Decreasing the commutator diameter to 8 or 9 in. as was done in the present standard single reduction motors, cuts the distance between brush holders to about the minimum safe distance for 600 volts in street

It is well known that an economical 1,500-volt motor can hardly be built for a rating under 250 hp. Hence, it is the universal practice when smaller motors are required for operation on this voltage, to wind them for half line voltage and connect two motors permenently in series. It makes a much more economical equipment and gives entirely satis-

factory results.

For the same reason, it is good practice to connect two small high-speed motors permanently in series for 600-volt operation. Commutator diameters of from 7 to $8\frac{1}{2}$ in. are about the maximum that can he used for the 35 to 60 hp. sizes. Such diameters on 600 volts will have practically no margin. If wound for 300 volts, the margin for good commutation and elimination of flashing will be very large. Other advantages that go with the 300 volt winding are a larger armature conductor and fewer turns per coil, both tending towards a more rugged construction, longer life for both hrushes and commutator, better insulation, less chance for breaking leads, and last but not least, a larger output for a given size of motor.

The increase in output due to winding these small high-speed motors for 300 instead of 600 volts amounts to about 10 per cent and is due to the better space factor of the windings; that is, on account of the smaller number of turns and the consequent smaller space required for insulation. It must be understood that while the motors are wound for 300 volts, they are insulated for 600 volts. The insulation to ground and the

creepage surfaces should be the same as for 600 volts. A motor so constructed will be rugged and reliable, and should be free from the troubles that have been heretofore experienced with high-speed motors.

Practically the only objection that can be raised to this is the possible greater wheel slippage, but since the tendency at this time is altogether toward fourmotor equipments with all weight on drivers, there is no difficulty to be found or experienced from this source. 300-volt motors in service on the cars with worm gear drive and differential axle have given no trouble whatever from this source in spite of the greater possibility of slippage with differential axles. Accelerations of 4.27 m.p.h. per second have actually been measured with one of them. The motors with double reduction gears and solid axles should have a still larger factor of safety in this respect.

There is an additional advantage in the equipment from the operation of two motors connected permanently in series, as it permits the same control equipment as used for a two-motor equipment of the same total capacity.

MANY DESIRABLE FEATURES

What is to be gained by the use of the ultra high-speed motor? It has several very advantageous features as applied, most of which are due to the mounting.

1. The motor weight is carried entirely on the truck frames or car body, so that the dead weight of the motor is entirely removed from the axle, and a great deal of punishment is thereby eliminated from the motors. The axlehung motor suffers severely from the vibration communicated to it from the roadbed. The vibration is a serious source of commutator and brush holder trouble and of broken armature leads. There is little doubt that it also helps to crystallize armature shafts. Much of this trouble will be eliminated in an allspring-supported motor. The track life will also be improved in proportion as the dead weight is removed from the

2. The high-speed motor is so small that a smaller wheel is possible when used with the double reduction gear unit. This permits a lower floor car to be used with a single step between the street and the car floor. It will do away with the ramps and permit a floor of one level throughout. It will speed up loading and unloading materially.

3. The high-speed motor equipment offers a substantial reduction in weight over the standard single reduction equipment. This may not show a corresponding decrease in energy consumption. However, the difference will only be a small amount either way and will not have much influence.

Keep on the Move or Die*

By Lucius S. Storrs

Managing Director American Electric Railway Association

IN ALL matters affecting the individual's business contact with his fellows the last ten wonderful years have brought about a complete change in the daily routine. The perfection of local and long-distance telephone connections, the multitude of personal transportation vehicles on the streets, and the general celerity with which all our business and social affairs are conducted, have brought about a state of mind, or perhaps of nerves, that makes each of us impatient of delays. We rush from home to work, from office to office, from point to point in our factories or stores. We rush to the theaters, night clubs or other entertainment and are loath to take the time for leisurely movement.

When we are confronted with traffic jams and delays in our trips through the cities we are more or less complacent if we are using our private autos, or even taxicabs, for we have within our personal control the matter of speed once the jam breaks and we get under way. But if we are caught in such a delay in a public vehicle, our impatience becomes intense and we become fearful that we will never reach our journey's end. That nebulous, intangible but none the less active force, public opinion, is working against the poor old street car. No matter what the facts may be, the public is convinced that there is no slower way of getting about than by using the street

Doubtless all of us have taken auto trips through cities in which the other fellow is responsible for the street car service and we have been caught in traffic signal delays with a street car just ahead. How often have you thought that traffic movement could be expedited greatly in that other fellow's city if he only had equipment capable of quicker acceleration, or a better arrangement of loading zones, or something else that would let you in your auto get by his street car.

Delays there will always be. They cannot be eliminated; but they are going to be vastly changed as we get to know more about how to handle traffic. One of the great irritants to the public in traffic congestion is the leisurely street car of the old style, that is always being caught in the rear of the procession and adding to the congestion. The newer type, quickly accelerating, rapid moving, car, is up in front of all signal-delayed traffic, and when the signal changes it is off and away before the automobiles get into second speed and is sure to beat them to the next corner. You can be sure the auto driver in a town where such cars are operated knows that the

*Abstract of a paper presented at the midwinter meeting of the New York Electric Railway Assaciation, New York, N. Y., Jan. 31, 1928.

street cars are fast. He is reasonably certain that he will not waste any time in using the cars instead of his auto.

Don't forget that the auto driver is going to be a trolley rider one of these days—but you can't just wish him onto the car. You have got to offer him something he will at least be willing to use, to say nothing of something he will be anxious to use.

This matter of speed isn't just a hopeless ideal. In one city I have tried

COMING MEETINGS

Electric Railway and Allied Associations

Feb. 13-17—American Institute of Electrical Engineers, winter convention, Engineering Societies Building. 33 West 39th Street, New York, N. Y.

Feb. 17-18—Central Electric Railway Accountants' Association, Hotel Gibson, Cincinnati, Ohio.

March 2 — Metropolitan Section, American Electric Railway Association, Engineering Societies Building, New York, N. Y.

March 13-15—Oklahoma Utilities Association, annual convention, Tulsa, Okla.

March 14-15 — Illinois Electric Railway Association, Springfield, Ill. March 23—Maryland Utilities Association, annual meeting, Emer-

son Hotel, Baltimore, Md.

March 30—Executive Committee
American Electric Railway Association, 292 Madison Avenue, New
York, N. Y.

May 2.5—Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27 — American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

July 8-12—Publio Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio. going by both trolley and taxi to a hotel some two miles from the business center. The streets there are wide enough amply to provide for the traffic, and the street car has won more times than it lost. Autoists in that city give the rails a wide berth if there is a chance of a trolley car coming along.

It can be done, and it is being done! But, relatively, so few managements as yet have the vision of speed possibilities that I am fearful that passenger traffic will be congesting the airways before there is a general realization of the possibilities of the

electric railway cars.

Many of the most careful students in our industry have come to the conclusion that only so-called "necessity riding" is left for the street car. I would like to have their definition of "necessity riding." Surely it is a flexible term. Logically, the volume of such use of the cars depends very largely if not entirely on the type and quality of the service offered. But granting a minimum use of the cars as "necessity riding," then there is now, and will increasingly be, a maximum use that will be determined solely by the service characteristics.

There are electric railway managements that are firmly convinced that the service requirements of their territories can be fairly met with motor vehicles. Analysis shows that the street car service is being performed with the identical vehicles that were in use twelve years ago-same trucks, same motors, same bodies, same men, same methods. The only thing that is not the same is the number of passengers carried. Is it any wonder that the new automotive vehicles, with the new ideas and methods, appeal to public and management alike? But there never will be the same net as there was in the old days, no, nor as there could be in the near future, if some of the new ideas and new money were to find expression in the street car phase of the business. Ideas have got to move as well as street cars!

The amazing thing to me is that our own people cannot see the thing in its true proportions. They keep holding back and will not buy new cars or recondition older ones because the revenue is down and people don't use the cars. People don't use the old things because they were in use back in the dark ages—a perfect circle of can'ts and won'ts; no one getting anywhere except the railway, and that is

getting broke.

And yet there are bright spots where an entirely different treatment has been given to the problem, where there is the greatest optimism in the management. There is on a number of properties a willingness to provide the best service possible with new equipment and new ideas preceded by a demand for higher rates. It is needless to say that higher rates were granted, and that by a complacent public. The maximum effect of high rates is possible only where the public's approval is obtained in advance of commission authorization.

Traffic Lights Relieve Congestion*

By R. W. EMERSON

Vice-President and General Manager Cleveland Railway

to determine, first, the necessity or desirability of making the installation, and second, the settings at which the signals should operate after installation. Signals should be installed only if the traffic movement will be improved by their presence or where safety cannot be otherwise provided. In Cleveland, an investigation is made to determine the number of vehicles arriving at the crossing, the number of lanes available at the intersection and whether or not there is a heavy left movement. When the need for mechanical signal control is established, a check is made at each intersection to determine from the traffic volume, prevailing movement, the number of available moving lanes, the influence of pedestrians and other factors governing traffic movement, the timing at which signals should be operated. These investigations have shown the use of short movements desirable. Cycles as low as 40 seconds are employed at many intersections.

Officer control at most isolated intersections can be an improvement over mechanical control if the officer appreciates the value of short movement and can give full time to his work. However, traffic officers must answer questions, assist pedestrians and enforce regulations, and these requirements, together with the common tendency to give long movement, to wait for wide-spaced vehicles approaching the intersection and the natural slow-down of activity as the officer becomes worn out by the monotony of the work, leave few officers efficient in traffic control.

CLEVELAND'S TRAFFIC LIGHTS

At the present time Cleveland has installed 225 traffic lights, all suspended in the middle of the intersections. The great majority of these are at isolated corners in outlying sections and work independently. In numerous cases, where two intersections are not separated by more than 400 ft., two of these lights are tied together, working synchronously.

In addition to these intersections, we have three series or groups working on the progressive system. When running on the scheduled speed, automobiles arrive at each intersection after signals have been set to handle them without delay. Between the passing of these groups movements are given to cross traffic.

The first installation was that of East Cleveland, where, due to the extreme congestion on Euclid Avenue and the contemplated widening of the street, it became necessary to substitute some form of mechanical control for the manual control then in use. The first plan was to install a synchronous system. The length of the street proposed to be so controlled was approximately $2\frac{1}{2}$ miles. It was proposed to install

INSTALLATION of traffic control traffic signals at sixteen intersections in this distance.

Our experience with synchronous control up to this time had been very disastrous. The city of Cleveland had installed a series of synchronous lights in the congested district of Euclid Avenue, from East Eighteenth Street to the Public Square, which had the effect of slowing up car movement 20 per cent and increasing the average cost considerably, due to the increase in the demand which resulted from the simultaneous starting up of all cars in this area upon the appearance of the green light. In fact, this was so pronounced that an inspection of our recording power charts in the substations showed clearly the result on the power demand upon the appearance of each green light.

PROGRESSIVE SYSTEM STUDIED

With this effect in a distance of less than a mile, the Cleveland Railway readily perceived the difficulty that would ensue with a similar installation over a distance of $2\frac{1}{2}$ miles, and as a progressive system had just been installed in the Loop District of Chicago, the company persuaded the officials of East Cleveland, Cleveland and Lakewood to accompany our officials on a trip to Chicago, where the system was minutely inspected. They learned that the system had been put into effect without any inconvenience and that, by its operation, traffic was moved through the Loop District more rapidly and more uniformly than previously. Street car movement in the area affected had been speeded up 20 to 25 per cent.

The officials of East Cleveland were profoundly impressed with this demonstration and voted to install a similar system on Euclid Avenue in spite of the considerable increase in cost over the original contemplated synchronous system. The Cleveland Railway, being equally interested in rapid car movement and decreased power costs, contributed largely to the work of installation, the city and the company working hand in hand to the end that the timing of the lights should correspond to our schedule speeds, which we then increased to 12 m.p.h. This street car speed permitted a speed of 24 m.p.h. or twice the street car speed for other vehicles. In other words, an automobile would run through two blocks while a street car moved through one.

The East Cleveland City Hall, being located approximately in the center of the system, provided the most logical location for the central control board. From this board, the lights at any intersection can be changed and the entire cycle which determines the speed throughout the area can be varied at

*Abstract of a paper presented at the midwinter meeting of the New York Electric Railway Association, New York, N. Y., Jan. 31, 1928.

will. The determining factor in the engineering calculations preliminary to this installation was the condition existing at Euclid and Superior Avenues, which is an oblique intersection, involving many left turns in two directions. To control this difficult intersection, six lights were installed.

IMPROVEMENT WITH LIGHTS

A check of this corner since installation shows definitely that many more machines pass with less congestion. Before the installation of the system, west-bound automobiles on Euclid Avenue were lined up for several blocks during many busy hours, whereas since the lights have been installed the line seldom extends beyond one block.

Profiting by the experience of East Cleveland, the city of Cleveland immediately started a study looking toward the conversion of the synchronous system installed on Carnegie Avenue to the progressive system. Carnegie Avenue is a boulevard, having no car tracks on it and is 3 miles in length. This change was made by an additional expenditure of about \$7,500, to provide a master control, located at the center point on the system and control wires from it to each of the lights to coordinate their operation. The result of this change was to speed up the automobile traffic 30 per cent. Almost immediately thereafter the city changed the synchronous system on Euclid Avenue to the progressive system, thereby permitting us to speed up our schedules

in this district by 20 per cent.

The city of East Cleveland, the city of Cleveland and the Cleveland Railway are convinced that traffic, controlled by automatic lights arranged in a progressive system, not only speeds up traffic, thereby relieving congestion, but so regulates headways as to render the advantage obtained applicable to other parts of the line not controlled by automatic lights. In addition to this uniform and smooth operating control. there is a marked reduction in accidents, due to the discouragement of speeding and the opportunity which is offered pedestrians to cross busy thoroughfares in safety. This is evidenced in the police records of East Cleveland, showing that there were 369 automobile accidents in this district in the year 1925 and only 155 in the year 1927, despite the usual increase in the number of automobiles upon the highway year

by year. Cities general have merely in scratched at the possibilities of automatic control of their traffic. There is an almost universal absence of engineering investigation preceding the installation. Most cities confronted with a serious congestion problem are deluded by the traffic light salesmen into the belief that their problem will be immediately solved by the installation of numerous lights. Such is far from the truth. Most light installations at the present time are a hindrance to the movement of traffic and tend to create congestion rather than relieve it.

Upon the purchase of a number of units by any city, there comes imme-

diately a flood of requests from councilmen or aldermen for the installation of lights at their pet corners and for the most part, lights are distributed with reference to the respective political influence of the various public representatives rather than by the traffic requirements of the community. Unnecessary installations, operated continuously, while the demand is seasonable or covers only a short period of the day, contribute to violations.

Traffic lights, as such, are not a panacea for our congestion problem. There are certain locations where probably no mechanically controlled light will operate better than the present manual control. Our experience in Cleveland, however, has demonstrated to our own satisfaction that the progressive system, installed throughout a considerable extent of the congested district, when scientifically installed, does relieve congestion.

Brakes as They Affect Schedule Speeds and Accidents*

By E. R. FITCH

District Engineer Westinghouse Traction Brake Company

ONLY by taking advantage of every possible improvement in detail brake performance can we hope to supply to our fullest ability the increasing demand for faster and safer transportation. All factors which affect the schedule speed and particularly the braking characteristics of the car or train, influence the capacity of the system to a marked degree. An analysis of recent improvements in traction brake equipment shows that the stopping time is reduced approximately a half second for every second clipped from the brake application time, the standing time is shortened by the quicker release and that the flexibility of control has not been sacrificed. The most important development in recent years in surface car braking is the variable load attachment, which has been in subway service for the last thirteen years. The weight of the original design prohibited its use on city surface cars.

The combined effect of these modifications is to increase the running speed from 14.1 m.p.h. to 15 m.p.h. or 6.4 per cent, of which the effect of the variable load alone is 0.8 m.p.h. or 5.6 per cent. This is based on average surface car conditions assuming 30,000 lb., four-motor cars with a load of approximately 16,000 lb. or 110 passengers, with 8.15 stops per mile.

Good surface car brakes induce confidence in the car operator in his ability to stop promptly which results in the car keeping abreast of the traffic stream in heavy congestion instead of continually dropping behind. From a review of these elements it will be seen that the earning capacity of the cars would be increased at least 3 per cent due to the brake improvements at an increase in car cost of only 1½ per cent.

There is no one factor more important in the claims department record of accidents than brake performance and brake integrity. The latter may be considered to include protection of the brake to function even if one or more devices are defective, protection against

*Abstract of a paper presented at the midwinter meeting of the New York Electric Railway Association, New York, N. Y., January 31, 1928.

man failure, against door and step accident, wheel sliding on bad rail, depletion of reservoir pressure, brakes leaking off when changing ends, and preventing passenger panic if the operator becomes incapacitated by permitting egress from the car when it is automatically stopped. The air brake and safety car control equipment provides this insurance through the deadman emergency feature, which balances the doors, sands the rail, cuts off the power and produces the shortest possible stop.

The recent improvements previously described will shorten the stop of the cars, already compared on a schedule speed basis, about 14 ft. for the reduction in application time of one second and about 40 ft. under the load condition with the variable load attachment from an initial speed of 20 m.p.h.

In the face of an impending collision, therefore, the car with this improved brake would be completely stopped while the other would be running at a speed of 8 m.p.h., retaining 40 per cent of its initial speed. This is probably the most important consideration as regards brake performance and its relation to accident hazards

The ultimate measure of brake performance is the stopping distance and for comparative conditions from an initial speed of 20 m.p.h. a reduction of one second in the application time indicated a corresponding reduction in the stop distance of 14 ft. or about 10 percent; under the load condition the variable load brake shortened the stop 28 per cent.

The actual brake shoe force developed is influenced to a marked degree by the details of brake rigging design. New cars with well designed brake rigging are generally conceded to develop about 70 to 75 per cent of the nominal shoe force and the loss of 25 per cent is due to rigging friction, release springs, armature and wheel inertia. For some of the old cars this figure may be as low as 50 per cent. Other conditions being comparative this factor alone means that the stopping distance would be increased 33 per cent. Obviously this condition would prevent the development of the full capacity of the cars.

Central Accountants Announce Program

SECRETARY L. E. Earlywine has just announced the program for the 56th meeting of the Central Electric Railway Accountants' Association. The meetings will be held at the Gibson Hotel, Cincinnati, Ohio, on Feb. 17 and 18. They will be preceded by a meeting of the executive committee at 9:30 a.m. the first day.

FRIDAY, FEB. 17, BEGINNING 9:45 A.M.

Address of Welcome, Benjamin Frankland, auditor Cincinnati Street Railway.

"Ticket Office Ticket Printer," by L. P. Stickel, Ohmer Fare Register

"Changed Price Levels and Property Accounting," by H. G. Baldwin, American Appraisal Company.

Discussion of items published in the Agenda.

Informal dinner, 6:30 p.m.

SATURDAY, FEB. 18, BEGINNING 10 A.M.

"Interlining with Central Freight Association" Informal discussion led by C. E. Baker, auditor Lima Toledo Railroad.

General business. Election of officers.

Brady Memorial Awards to be Presented

PRESENTATION of the three Anthony N. Brady Memorial medals, awarded by the American Museum of Safety for outstanding accident prevention and health promotion work among electric railway organizations for the year ended Dec. 31, 1926, will be made at ceremonies to be held at the Hotel Biltmore, New York, N. Y., on Feb. 17. Many persons prominent in the electric railway field will attend the meeting.

Lewis Gawtry, chairman of the museum's committee of award, will preside. The medals and certificate will be presented by Haley Fiske, president of the Metropolitan Life Insurance Company. Other speakers will be Arthur Williams, president of the American Museum of Safety; Col. A. B. Barber, Lucius S. Storrs and James H. McGraw, members of the committee of award.

The awards for 1926 are: Gold medal, Louisville Railway; silver medal, El Paso Electric Company; bronze medal, Tide Water Power Company; and certificate of honorable mention, Pittsburgh Railways.

Safety Congress Meeting in New York City

THE Seventeenth Annual International Safety Congress is to be held in New York City Oct. 1 to 5 inclusive. This decision was made recently by the Executive Committee of the National Safety Council. All of the old popular features will be retained and several innovations introduced.

Progress in Band Brake Design*

By A. D. McWhorter General Superintendent Memphis Street Railway, Memphis, Tenn.

In DEVELOPING the light-weight noiseless railway coach, one of the major problems was to develop a light-weight noiseless brake rigging. As a result, the band brake on street railway cars is today a reality. In general there are two types of band brakes, the external, or clasp type, and the internal expanding type. The internal expanding type, such as used on the Joliet car, utilizes metal brake blocks, while the external clasp type uses either brake lining or metal blocks.

There are probably less than a dozen street railway companies in the country using such brakes. According to available records, the first experimental equipments were designed by W. J. Smith, master mechanic Twin City Rapid Transit Company, Minneapolis, in the summer of 1920. The original experimental equipment was on double-truck cars, approximately 37 ft. long and weighing 28,000 lb. Satisfactory results have been reported and since that time the Twin City company has built for its own use and for other companies a total of 101 cars equipped with the Smith light-weight noiseless truck with band brakes.

STEEL AND GRAY IRON DRUMS USED

Both steel and gray iron drums have been used, steel being the lighter, gray iron the quieter. Gray iron has been adopted as standard. Brake shoe backs are steel, lined with \(\frac{3}{4}\)-in. "Hyco" brake lining and soft gray iron lugs at the ends. The total cost per lining (8 linings per car) is \(\frac{\$2.36}{.}\). The average cost per thousand car-miles for brake linings is \(\frac{\$1.06}{.}\). Gray iron brake shoes at \(\frac{\$40}{.}\) per ton used on steel wheels in similar service cost \(\frac{\$1.74}{.}\) per thousand car-miles. In addition to the above saving in favor of brake bands, there is also a saving in labor in adjusting and renewing brake shoes, adjustment being necessary only after 2,000 miles service.

In the 33 months of operation, the total mileage was 511,500, an average of 93,000 miles for the wheels. To date only a few of the wheels have been removed. Officials of the company believe that the wheel mileage on this class of equipment will be increased from 40 to 50 per cent. The weight of the wheels when new was 297 lb. When removed from service, the weight was 139 lb. In other words, in 93,000 miles service, 108 lb. of weight was lost. Under similar conditions but with gray iron brake shoes used on the tread of the wheel, 60,000 to 65,000 wheel-miles would be considered a fair average. This comparison would indicate about 33 per

IN DEVELOPING the light-weight continuous continuous in wheel-miles with band brakes. The above description of equipment applies to hollow street car axle trucks.

The Tennessee Electric Power Company, Chattanooga, placed in service about Nov. 1, 1926, ten cars built by the Twin City Company. Up to Jan. 1, 1928, these cars operated a total of 594,000 miles. They experimented with many kinds of linings and adopted the Gatke brake linings as standard. Adjustment is made on a 1,000-mile basis but experiments have proven that the adjustment period may be extended to 3,000 or 4,000 miles. The cost per thousand car-miles with $\frac{1}{2}$ in. by 6 in. Gatke brake linings is \$1.16. It is the opinion of the operating officials that the cars equipped with band brakes are much quieter than cars with brake beams, hangers, heads, shoes, etc. The estimated life of 26-in, wheels with band brakes is 100,000 to 125,000 miles.

The Springfield Street Railway, Springfield, Mass., has had a double truck car in service since May 13, 1927, which has operated approximately 8,000 miles. It has a seating capacity of 45 and weighs 25,300 lb. The brake equipment was assembled from Westinghouse Air Brake Company material, making whatever changes were necessary to accommodate standard equipment to the special requirements. essential features are an application and release magnet, and an emergency magnet which in conjunction with a K-1 emergency valve gives all safety features on open circuit. Sanding is accomplished, except in emergency, by means of magnet valves.

BRAKE SHOES OF SPECIAL MATERIAL

The brakes are inspected during the car inspections made every 1,000 miles. Adjustment is not always necessary on the 1,000-miles basis. The brake shoes are of special material, manufactured by the American Brake Block Company, and have proven very satisfactory. To date the brake shoes show no appreciable wear and officials have no figures as to cost per 1,000 car-miles. It is estimated that considerably longer wheel life will result from wheels which are not subject to gray iron shoe wear.

When this special material is employed the coefficient of friction is much more constant under varying speeds than with gray iron shoes on a steel wheel. The brakes give a very smooth stop without the sudden shock which is experienced with gray iron shoes just before the car comes to rest. This is true even with excessive rates of braking. In trials with various types of brake linings and various materials for brake drums, it has been found that certain combinations give more effective braking power and that squeaking noises can be eliminated. In Chatta-

nooga the Gatke brakelining with Hunt Spiller gun iron drums have been found quiet and most satisfactory. In tests which have been made, the deceleration has run as high as 4.35 m.p.h. per second without discomfort. The ordinary braking rate on this car is around 2 m.p.h.

In Joliet, Ill., there is in operation an experimental car equipped with Westinghouse automotive type brake diaphragms, carried directly on the automotive type axle housings and connected through the brake mechanism to the internal expanding shoes at each wheel. The brake drums are 174 in. in diameter with 4-in. face. They are bolted to the inside of the wheels and have fins turned on their outside surface to improve heat radiation. There is in effective wearing metal to insure long life before renewal is necessary. Two brake blocks are used on each shoe having an area 4 in. by $5\frac{1}{2}$ in. Almost four times the braking surface ordinarily provided on buses is thus obtained.

American Association News

DETAILS of the work now in progress were discussed at a meeting of way and structures special committee No. 2 at association headquarters, New York City, on Jan. 18.

A drawing of the proposed 200-ft. lateral switch was submitted by Mr. Stiff, who was representing Mr. Entwisle. In the discussion which followed, Mr. Ryder suggested shortening the tongue and over-all length of the switch, which would make tongue and casting stiffer and lighter, and should reduce the cost of the switch. Mr. Alden objected on the grounds that it would increase the overhang on clearance curves about 1 in. or less and increase the angle on incidence $\frac{1}{2}$ deg. It was decided that the 16-ft. 6-in. over-all length of switch be maintained, the point of the tongue to be 2 ft. 8 in. from the end of the casting, measured at a point 1 in. back from the tip of the tongue, and between these points to be exactly the same as the 100-ft. lateral switch.

The shape of the pocket for the 200-ft. lateral switch was discussed and changes were suggested by Mr. Stiff. Mr. Alden was requested to make a new drawing showing the approach radius on both sides as 5 in., and the pocket radius on both sides as $1\frac{1}{2}$ in. Copies of the drawing are to be sent to all members of the committee for study, and the chairman will send out a letter ballot for approval.

The width of groove for both the 100-ft. lateral and 200-ft. lateral switches was discussed at length. It was decided that in all switches of 100 ft. and larger radii the groove be made 1 % in.

On the way to lunch the committee looked over several special-work lay-

^{*}Abstract of a paper presented at the semi-annual meeting of the Electric Railway Association of Equipment Men. Southern Properties, held at New Orleans, La., Jan. 25-28, 1928.

outs of the Third Avenue Railway to Mr. Alden made note on his plans, were observe the effect of wheel wear on the tread of the running rail at the pocket and to determine if possible whether the shape of the pocket had any particular relation to the development of a cup on the tread of the rail at that location.

At the afternoon session drawing No. 114,152, 9-in. high standard switch, prepared by Mr. Entwisle was submitted and discussed. The design was approved by the committee, except that the diagonal braces should follow the revised design for 100 ft, lateral switch. It was also voted that plan No. 110,113 for the 200-ft. equilateral switch be approved and Mr. Alden was requested to prepare a finished drawing for submission at the next meeting. The plan proposed at the previous meeting "that the distance from the tangent point to the point of tongue, and length of tongue, and location of lug be determined for the 50-ft. lateral, 75-ft. lateral, 100-ft. equilateral and 350-ft. equilateral tongue switches" was tabled for the time being.

After discussion the committee decided that the manufacturer's name or brand be placed on the cast-iron cover, on the guard of the switch tongue, and also on the guard of the switch body just back of the tongue pin. Just beyond the manufacturer's name or brand on the guard shall be placed the letters A.E.R.E.A., followed by the figures indicating the radius, and letters indicating the hand. Mr. Payne asked for further instructions on the subject, and also presented plans for several different types now in use. After discussing the matter Mr. Payne was requested to prepare two designs, one for T rail in open track and one for girder rail in closed track.

The committee decided to change the title of subject D from "Maintenance Standard for Track Switch Tongues in Paved Streets," to "Rules for Mainte-nance of Tongue Switches." Mr. Bragg presented a report giving rules for the maintenance of hand-throw tongue switches, and also for electrically operated tongue switches. He was requested to make some changes suggested by members of the committee and report at the next meeting.

Mr. Peabody submitted a plan showing three layouts for No. 8 double spring frog marked A-B-C. Layout B was approved with some changes to be made. It was decided that to have a supported joint at the toe of the frog, and that the space at the toe be $19\frac{1}{2}$ in. and the spaces at the heel be 18 in. making a suspended joint at the head. Over-all length of the frog is to remain 15 ft. Design 1521 of the Bethlehem Steel Company for double spring rail frog will be used for the design of the anti-creeper device, in place of the arrangement shown on layout B of Mr. Peabody's design.

Mr. Alden submitted two drawings for the proposed 16-ft. 6-in. long split switch, one for wheel flanges A, B, C and D only and one for wheel flanges A, B, C, D, and E and F. After considerable discussion it was decided by the committee that the spring should be 18 in. long. Other changes, of which

suggested by the committee and Mr. Alden was requested to submit at the next meeting of the committee a revised single plan covering the subject instead of two plans.

Association Headquarters on Friday, Feb. 24.

Those present were E. M. T. Ryder, chairman; E. P. Roundey, vice-chairman; H. F. Heyl, C. A. Alden, G. A. Peabody, D. R. Payne, J. U. Bragg and The next meeting is to be held at Mr. Stiff representing Mr. Entwistle.

Affiliated Association Committee Appointments

OMPLETE assignments of committees of the American Electric Railway Association and affiliated associations have now been made. The list of American committees was published in full on Jan. 28. The Engineering Association committees were published as they were appointed after the beginning of the association year. In the following list are the complete committee lists of the Accountants', Claims, and Transportation and Traffic Associations, together with certain Engineering Association committees which have not heretofore been made public.

Accountants' Association

FARE COLLECTIONS

E. A. Tuson, general auditor Public Service Railway, Newark, N. J., chairman.

J. D. Evans, St. Louis, Mo. A. G. NEAL, Washington, D. C. W. G. Nicholson, Omaha, Neb.

FREIGHT ACCOUNTING

WALTER SHROYER, treasurer for receiver Union Traction Company of Indiana, Anderson, Ind., chairman.

F. I. Fleming, Champaign, Ill. F. A. HEALY, Springfield, Ohio L. T. Hixson, Indianapolis, Ind. A. E. Wafer, Akron, Ohio

REVIEW THE PROCEEDINGS

J. E. Heberle, assistant to president Capital Traction Company, Washington, D. C., chairman.

F. E. HAGEMAN, Milwaukee, Wis.

STANDARD CLASSIFICATION OF ACCOUNTS

M. W. GLOVER, general auditor West Penn Railways, Pittsburgh, Pa., chairman.

THOMAS CONWAY, JR., Philadelphia,

J. H. HANNA, Washington, D. C. I. A. May, New Haven, Conn.

C. S. MITCHELL, Pittsburgh, Pa. H. L. Wilson, Boston, Mass. P. S. Young, Newark, N. J.

COUNT)

STORES ACCOUNTING

R. A. Weston, special accountant the Connecticut Company, New Haven, Conn., chairman.

W. S. STACKPOLE, Newark, N. J. F. E. WILKIN, Youngstown, Ohio BUS ACCOUNTING (SUB-COMMITTEE, STANDARD CLASSIFICATION OF AC-

E. A. Tuson, general auditor Public Service Railway, Newark, N. J., chair-

C. R. Mahan, Highwood, Ill.

J. F. Schmunk, Philadelphia, Pa. C. W. Stocks, New York, N. Y. N. E. Stubbs, Baltimore, Md.

Convention Program

E. H. Reed, auditor Brooklyn City Railroad, Brooklyn, N. Y., chairman.

L. T. Hixson, Indianapolis, Ind. C. E. Yost, Wilmington, Del.

EDITING

L. E. LIPPITT, Thermo-ice Corporation, Auburn, N. Y., chairman.

Engineering Accounting

L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., chairman.

F. A. HEALY, Springfield, Ohio T. P. KILFOYLE, Cleveland, Ohio C. R. MAHAN, Highwood, Ill. WALTER SHROYER, Anderson, Ind.

Claims Association

EDITING

W. F. Weh, superintendent accident department Cleveland Railway, Cleveland, Ohio, chairman

H. D. Briggs, Newark, N. I. W. H. HYLAND, Gloversville, N. Y. WALLACE MUIR, Lexington, Ky. J. J. REYNOLDS, Boston. Mass.

SAFETY

H. K. Bennett, safety manager United Electric Railways, Providence, R. I., chairman.

A. D. Brown, Syracuse, N. Y.

H. E. CADY, Utica, N. Y. J. R. Compton, Birmingham, Ala.

R. H. FERGUSON, Chicago, Ill.

J. W. GILTNER, Akron, Ohio G. H. INGLES, Richmond, Va.

A. G. JACK, Wilmington, Del. P. W. KLABUNDE, Milwaukee, Wis.

T. C. Neilson, East St. Louis, Ill. J. M. Orts, Newark, N. J.

J. J. REYNOLDS, Boston, Mass.

Subjects

J. R. McNary, manager of adjust-ment department, Pittsburgh Railways, Pittsburgh, Pa., chairman.

A. T. Bagley, Kansas City, Mo. S. W. Baldwin, New Haven, Conn. J. J. K. Caskie, Buffalo, N. Y. H. V. Drown, Newark, N. J.

Engineering Association

ELECTRIC RAILWAY JOURNAL Maintenance Contest

A. T. CLARK, superintendent rolling stock and shops United Railways & Electric Company, Baltimore, Md., chairman.

H. H. George, Newark, N. J. Charles Gordon, New York, N. Y. G. C. HECKER, New York, N. Y. F. McVITTIE, Rochester, N. Y.

Engineering—Accounting

E. D. Dreyfus, advisory engineer West Penn Railways, Pittsburgh, Pa., chairman.

E. J. Dickson, Pasadena, Cal. C. R. HARTE, New Haven, Conn. R. B. RIFENBERICK, Detroit, Mich.

ROLLING STOCK SPECIAL COMMITTEE No. 7—Automatic Coupler Specifications

P. V. C. SEE, superintendent of equipment, department of railways, Northern Ohio Power & Light Company, Akron, Ohio, chairman.

C. M. Bange, Scottsburg, Md. M. W. BARNELL, Dayton, Ohio A. J. CHALLEEN, Detroit, Mich. J. B. Corderman, Lima, Ohio

A. B. Creelman, Youngstown, Ohio

D. C. DAVIS, New York, N. Y. G. G. FLOYD, Chicago, Ill. F. J. FOOTE, Springfield, Ohio H. W. GILBERT, Cleveland, Ohio G. T. JOHNSON, Columbus, Ohio J. C. McCune, Wilmerding, Pa.

T. H. NICHOLL, Anderson, Ind.

A. L. PRICE, Mansfield, Ohio H. E. VAN DORN, Chicago, Ill.

WAY AND STRUCTURES SPECIAL COM-MITTEE No. 9-Motor Bus Garage DESIGN

Adrian Hughes, Jr., superintendent of bus transportation United Railways & Electric Company, Baltimore, Md.,

A. J. BLACKBURN, Boston, Mass. A. J. CHALLEEN, Detroit, Mich.

D. E. FRAME, Wilmington, Del. G. H. HALDEMAN, Newark, N. J. J. H. Lucas, Milwaukee, Wis.

J. R. McKay, Ft. Wayne, Ind. L. F. Parlette, Philadelphia, Pa. S. R. Sundstrom, Indianapolis, Ind. W. W. Wise, New York, N. Y.

WAY AND STRUCTURES SPECIAL COM-MITTEE No. 16-FOUNDATION AND SUPPORTING STRUCTURES FOR STEAM RAILROADS

L. A. MITCHELL, engineer maintenance-of-way Union Traction Company of Indiana, Anderson, Ind., chairman.

H. A. ABELL, Rochester, N. Y. R. B. Brokaw, Peoria, Ill. P. A. Meyer, Connellsville, Pa. J. C. Newman, Richmond, Va. J. H. Sundmaker, Cincinnati, Ohio D. H. WALKER, Indianapolis, Ind.

Representatives on Other National Organizations

AMERICAN RAILWAY ENGINEERING Association

W. W. Wysor, Baltimore, Md., representative.

AMERICAN WELDING SOCIETY

E. M. T. RYDER, New York, N. Y., representative.

NATIONAL ASSOCIATION OF PURCHASING AGENTS

ELECTRICAL CONTRACT FORMS L. D. Bale, Cleveland, Ohio, representative.

NATIONAL FIRE PROTECTION ASSOCIATION

Power House Committee

L. D. Bale, Cleveland, Ohio, representative.

G. C. HECKER, New York, N. Y., representative.

GARAGE COMMITTEE

K. B. Brier, Philadelphia, Pa., representative.

A. D. Knox, New Haven, Conn., representative.

G. C. HECKER, New York, N. Y., representative.

NATIONAL SAFETY COUNCIL

ELIMINATION OF HARMFUL NOISE H. S. WILLIAMS, Detroit, Mich.

SOCIETY OF AUTOMOTIVE ENGINEERS Motor Coach Division

V. W. Berry, Richmond, Va., representative.

U. S. DEPARTMENT OF COMMERCE

COMMITTEE TO CO-OPERATE ON SUBJECT OF STANDARDIZATION

E. P. Goucher, Washington, D. C., chairman.

A. S. SINCLAIR, Washington, D. C. W. W. Wysor, Baltimore, Md.

COMMITTEE ON WELDED RAIL JOINTS OF THE A.E.R.A. AND THE AMERICAN BUREAU OF WELDING

EXECUTIVE COMMITTEE

G. K. Burgess, Director Bureau of Standards, Washington, D. C., Chairman.

E. M. T. RYDER, New York, N. Y., vice-chairman.

W. Spraragen, New York, N. Y., secretary.

C. A. Adams, Cambridge, Mass.

R. H. Dalgleish, Washington, D. C. G. C. Hecker, New York, N. Y. H. M. STEWARD, Boston, Mass.

G. L. Wilson, Minneapolis, Minn. W. W. Wysor, Baltimore, Md.

AMERICAN ENGINEERING STANDARDS COMMITTEE

C. R. HARTE, New Haven, Conn., representative.

W. W. Wysor, Baltimore, Md., representative.

G. C. HECKER, New York, N. Y., alternate.

Transportation and Traffic Association

Bus Operation

Adrian Hughes, Jr., Superintendent of bus transportation United Railways & Electric Company of Baltimore, chairman.

B. W. Arnold, Milwaukee, Wis. C. H. CHAPMAN, Waterbury, Conn. J. C. Johnson, Michigan City, Ind. C. F. Kells, Pittsburgh, Pa.

J. J. Mangan, New York, N. Y. M. G. Moore, Boston, Mass.

T. W. Noonan, Pittsburgh, Pa. E. S. Pardoe, Washington, D. C. J. M. Penick, Richmond, Va. M. W. Rew, Cleveland, Ohio.

Leo Reynolds, Detroit, Mich. Alexander Shapiro, Washington, D. C.

J. L. SMITH, Toronto, Canada. A. T. WARNER, Newark, N. J. H. G. WEEKS, Los Angeles, Cal. W. H. BOYCE, Pittsburgh, Pa., sponsor.

F. L. Butler, Atlanta, Ga., sponsor. SAMUEL RIDDLE, Louisville, Ky., sponsor.

EDITING PROCEEDINGS

SAMUEL RIDDLE, Louisville, Ky. P. E. Wilson, Cleveland, Ohio.

SERVICE BETTERMENT

W. E. Wood, president Virginia Electric & Power Company, Richmond, Va., chairman.

A. C. Spurr, Wheeling, W. Va., vice-

chairman.

J. L. ALEXANDER, Houston, Tex. A. J. BOARDMAN, Boston, Mass.

J. F. CRAIG, New York, N. Y.

L. C. DATZ, St. Louis, Mo.

L. J. DELAMARTER, Grand Rapids, Mich.

C. H. Evenson, Chicago, Ill. D. L. Fennell, Kansas City, Mo. J. H. McClure, Dayton, Ohio.

E. A. Palmer, East Pittsburgh, Pa.

D. A. Scanlon, Akron, Ohio. D. A. Smith, Detroit, Mich.

J. B. Stewart, Jr., Cincinnati, Ohio. C. H. Strong, Atlanta, Ga. J. C. Thirlwall, Schenectady, N. Y.

W. E. THOMPSON, New York, N. Y. C. L. VAN AUKEN, Chicago, Ill. C. W. WILSON, Pittsburgh, Pa.

R. N. GRAHAM, Youngstown, Ohio, sponsor.

P. E. WILSON, Cleveland, Ohio, sponsor.

TRAFFIC AND SAFETY

R. W. EMERSON, vice-president and general manager Cleveland Railway, Cleveland, Ohio, chairman.

H. O. Allison, New Brighton, Pa. A. W. Brohman, San Francisco, Cal.

H. H. DARTT, Scranton, Pa. J. A. DEWHURST, New York, N. Y.

S. E. Emmons, Baltimore, Md.

C. H. English, Erie, Pa. A. J. Fink, Pittsburgh, Pa.

ARTHUR GABOURY, Montreal, Canada. W. W. Holden, San Antonio, Tex. R. J. Lockwood, St. Louis, Mo. E. K. Miles, Syracuse, N. Y.

C. S. Slocombe, Boston, Mass.

C. D. SMITH, Cleveland, Ohio. E. C. SPRING, Allentown, Pa.

G. B. Anderson, Los Angeles, Cal., sponsor.

W. H. BOYCE, Pittsburgh, Pa., sponsor. RICHARD MERIWETHER, Dallas, Tex.,

sponsor.

Exhibit

PREPARATIONS for the 47th convention of the American Electric Railway Association, to be held in Cleveland on Sept. 22-28, were carried forward at the meeting of the committee on exhibit held in the office of Col. Joseph H. Alexander, Cleveland, Ohio, on Feb. 8.

Those present included Chairman Alexander, L. W. Shugg, vice-chairman; C. S. MacCalla, chairman of the entertainment committee; J. C. Mc-Quiston, vice-chairman of the enterguiston, vice-chairman of the enter-tainment committee; J. W. Welsh, gen-eral secretary; F. C. J. Dell, director of exhibits; L. D. Bale, J. R. Blackhall, O. A. Broten, F. B. Bullock, W. E. Cann representing C. C. Castle, C. H. Clark, H. F. Flowers, R. A. Haur, C. S. Hawley, A. L. Kasemeier, H. J. Kenfield, E. J. Lang, H. E. Listman, S. P. McGough, A. M. Robinson, Ross Schram, S. P. Seward, L. F. Stoll,

for inspection of exhibits and plans for inspection of local manufacturing plants. These were published in this paper for Feb. 4, page 223. It was also pointed out that on account of the early dates for holding the convention this year it is planned to send out space applications on April 16, with 30 days' allowance for filing them.

Minutes of the meeting of a sub-committee appointed for the purpose of laying out floor plans were also read. This sub-committee, of which L. W. Shugg was chairman, met on Feb. 7. It was decided to recommend that the registration facilities should be placed in the new main building on the Lakeside Avenue side. After considerable discussion it was proposed to locate the dance floor in approximately the same position as last year. The same scheme as last year's for space layouts for the esplanade, the track space and the west wing was recommended. It was decided to recommend that the Engineers'



Members of the exhibit committee at the recent Cleveland meeting

J. B. Tinnon, L. G. Dickey, manager of the Cleveland Auditorium, and J. W. Kellison, assistant to president Cleve-

land Railway.

Mr. Dell was appointed to act as secretary of the meeting. He read the report of the director of exhibits, outlining the preliminary work which had heen done. A special committee on contract, with Frank R. Coates as chairman, has made the agreement with the Cleveland Convention committee, covering the housing and preparation of the exhibit. This agreement is drawn along similar lines to that of last year. Contracts have also been drawn with the sub-contractors for furniture, flowers, drayage, etc. The prices agreed to by all contractors are in line with those previously quoted. All contractors are acceptable to the Auditorium management and are acquainted with its personnel. The rules and regulations adopted are practically the same as those for last year, which were found very satisfactory.

Attention was called to the action of the executive committee of the association, which set a rate of 60 cents per square foot for inside space and \$2 per lineal foot of track space. Mention was also made of the resolutions regarding outside exhibits, assignment of one day meeting room be located in the lower exhibition hall, and that location of all the other meeting rooms be left to a special sub-committee. The report was approved by the main committee.

Chairman Alexander brought up the question of exhibit day, and Mr. Welsh explained the reasons for selecting Tuesday, Sept. 25, instead of Wednesday, the usual day. After hearing the report it was voted to set aside Tuesday as exhibit day. The space layout for the arena floor, with the ball room as recommended by the sub-committee, was approved.

Mr. Robinson spoke of the desirability of having the exhibits open at 9 a.m. on Saturday, Sept. 22, instead of at noon as was done last year. After a general discussion this opening time was approved. It was also decided to have a formal opening ceremony and some form of entertainment for Saturday evening. Mr. Welsh was instructed to inform the transportation committee to arrange so that the special trains will arrive in Cleveland in time for the opening.

It was decided to hold the next meeting of the exhibit committee, for the purpose of assigning space, at the office of the chairman, in Cleveland, at 10 a.m. on May 16.

Street Traffic Economics

RGANIZATION of the committee on street traffic economics was effected at a meeting held at association headquarters in New York City on Feb. 9. Those present included the following: G. A. Richardson, chairman; John A. Beeler, E. P. Goodrich, J. H. M. Andrews, J. R. Bibbins, S. E. Emmons, R. F. Kelker, Jr., E. J. Mc-Ilraith, L. H. Palmer, G. C. Hecker and Charles Gordon. After preliminary discussion of the scope of the committee's work it was voted to change the name of the committee to that given above instead of "street traffic and mass transportation," which was the name originally selected.

Most of the time of this first meeting was devoted to a discussion of the various phases of the street traffic problem with a view to determining the scope of the work to be undertaken this year and developing a plan of procedure. At the suggestion of Chairman Richardson, Mr. McIlraith read a rough outline of suggested topics for

consideration.

It was the consensus of opinion that the committee should confine itself this year to a consideration of only such phases of the traffic matter as could be handled in the limited time available, with the understanding that the committee's activities will probably extend over a period of several years, and that this year's studies will form the groundwork for the extension of its work.

It was likewise agreed that the committee should confine itself to the development and presentation of principles and basic facts that affect the proper solution of the traffic problem. It is not anticipated that the committee will be able to agree entirely on some of the fundamental principles involved, but in that event it will endeavor to present diverging views on the subject so as to provide the public and the industry with an adequate and authoritative outline of current thought on traffic matters.

At the suggestion of the committee, Mr. McIlraith prepared a rough outline of his suggestions regarding the scope of this year's work. The topics,

suggested were as follows:
"Reasons why people concentrate in cities and in central areas."

"Interpretation of purpose of streets as public thoroughfares."
"Legal history of rights to use of

streets.

"Present use of city streets in various types of cities (a) service in maximum hour showing number and type of existing traffic units, including pedestrians; (b) measure of relative use during various hours of the 24; (c) compilation of wastage of street space; (d) principles of betterment of use of streets; (e) betterment measures now in actual practice.

Mr. McIlraith was delegated to compile a more comprehensive outline of the available data and opinions on

these respective topics.

News of the Industry

Injunction Against New York Fare Increase Denied

Supreme Court Justice Ernest E. L. Hammer on Feb. 4 denied the application of the Bronx Chamber of Commerce to restrain the Interborough Rapid Transit Company from increasing the fare on its subway and elevated lines from 5 to 7 cents because the city was not a party to the action. The denial was without prejudice to a renewal on proper papers. It followed the assertion by Samuel Untermyer, special counsel of the Transit Commission, that such litigation at this time would serve only to "muddy the waters" and complicate matters. Mr. Untermyer asked for the postponement of any move for an injunction until the Transit Commission had acted on the Interborough's application to put the 7-cent fare into effect within five days.

Conferences among city and state officials on Feb. 9 resulted in an apparent agreement to oppose the application in three separate suits, one to be brought by the city, one by the Transit Commission and a third suit to be brought jointly by the city and the commission.

City Appeals Denver Case

The city of Denver has filed a petition with the United States Court of Appeals at St. Louis for a rehearing of the case in which that body declared in substance that the Denver Tramway franchise was perpetual. Talk has recently been revived of a plan to carry the case to the United States Supreme Court if the present plea for a rehearing is rejected. This is so even in the face of the fact that it was stated at the time the decision was rendered such a course was unlikely on the part of the city since the United States Supreme Court had refused in January, 1927, to take jurisdiction. The issues involved in this case were reviewed in the ELECTRIC RAIL-WAY JOURNAL for Dec. 24, 1927.

Commission Sought as Arbitrators in Fort Wayne

Formal request for the Indiana Public Service Commission to act as a board of arbitration in a wage dispute between the Indiana Service Corporation and its railway employees at Fort Wayne, Ind., was made in a petition filed by representatives of a committee said to represent a majority of the trainmen.

Wage increases sought as indicated in the petition follow: For the first three months from 41 cents to 65 cents an hour; after the first three months from 41 and 43 cents an hour to $67\frac{1}{2}$

cents, and for the succeeding nine months and more than a year 70 cents an hour. The present wages, the petition asserted, are "wholly inadequate to maintain a family and meet the living conditions in Fort Wayne."

The petition was filed under the terms of a clause in the working agreement authorizing employees to refer disputes to the commission for arbitration when relief is denied by the company.

New Fares in Port Arthur

A new schedule of fares went into effect on Jan. 21 in Port Arthur, Tex. It provides for the same 10-cent straight fare, three tickets for 25 cents and a weekly card for 40 cents, which calls for a nickel fare as many times as used each week, similar to the fare rates in Houston. The Port Arthur Traction Company was sold recently to the Eastern Texas Electric Company. Confirmation of the scale was made on Jan. 10 in federal court at Beaumont.

Ten Cents in Madison—Valuation Under City Figure

An increase in cash and ticket fares was granted the Madison Railways, Madison, Wis., by the Wisconsin Railroad Commission to take effect on Tuesday, Feb. 7.

Cash fares are increased from 8 cents to 10 cents; sixteen instead of seventeen tickets will be sold for \$1 and three tickets for 25 cents. School childrens' tickets will be sold at ten for 50 cents; two children under twelve will be allowed to ride for one adult ticket; heretofore such children were allowed to ride for 4 cents. These rates will also be applied to buses, but no free transfers will be allowed between trolleys and buses.

The order of the commission places the valuation of the property at \$1,203,000, whereas the company claimed a valuation of \$2,188,501.

The commission turned down the weekly pass privilege, which had been asked by the city. As to the contention of the city that lower fares would help the company more than higher fares the commission said:

As the lower fares have been in effect heretofore and did not produce the required return, we are satisfied and find that lower rates will not produce the desired result.

The commission has questioned an item of debt of \$73,951 against the company said to have once been cancelled but later restored as an obligation of the railway but apparently and inadvertently not entered on the books of account as an obligation.

Governor and Mayor Agree on Chicago Program

Governor Len Small and Mayor William Hale, Thompson of Chicago have agreed on a program which may speed settlement of the Chicago transportation problem. Following a conference with the Mayor, Governor Small issued the following statement:

Our minds have met on the desirability of giving Chicago home rule in the management and control of its traction and transportation problems, and in giving that city full power to negotiate franchises to become a law when approved by a majority vote of the people.

This does not necessarily mean the calling of a special session of the General Assembly to enact railway legislation, as the Governor has stated emphatically that he will not call a session for this purpose until the companies and the City Council are in complete accord on the bills to be enacted.

The Chicago City Council is showing a renewed interest in the transportation question and at the meeting on Feb. 10 was expected to consider the draft of bills proposed by the committee on local transportation. At that time it was also expected the transportation committee's subcommittee would present the draft of a bill providing for the consolidation of the surface and elevated lines. This committee was appointed to analyze the difference between the companies' and the local transportation committees' point of view.

Abandonment of Chestnut Street Tubes in Philadelphia

The city-Philadelphia Rapid Transit agreement for financing and construction of the \$20,000,000 Chestnut Street surface-car subway was set aside recently by unanimous decision of the Superior Court of Pennsylvania. In reversing the ruling of the Public Service Commission, which had approved the pact, the Appellate Court held that the title of the ordinance of City Council which embodied the contract was "defective in law." Judge William B. Linn, who wrote the opinion of the Superior Court, said the title failed clearly and sufficiently to express its purpose to grant a perpetual franchise to the Philadelphia Rapid Transit Company to use the subway after expiration of a 50-year lease, or of a sale or gift of the tube to the company upon expiration of the lease.

Civic bodies opposed the city-company agreement on the ground that the transit company, after meeting the carrying charges of the funds borrowed by the city for the construction, was not entitled to take permanent

possession of the line. Counsel for Zones Fares Up Five Cents on those organizations also contended the contract was tantamount to the city lending its credit to a private corporation, in breach of the law.

Mayor Mackey said the ruling of the Superior Court would allow for procedure with the construction of a surfacecar subway in Locust Street instead, with provision for a hook-up with Camden by means of the Delaware River Bridge.

Consultant on Electric Railway Safety Proposed

The executive committee of the electric railway section of the National Safety Council is considering the employment of a full-time consultant to serve on the Council's staff and help all of the members of the section to prevent accidents on their properties. A committee has been appointed on the subject; consisting of H. K. Bennett, Providence, chairman; E. K. Eastham, St. Louis,

Mo., and Melville W. Bridges, Chicago.
The committee has found that it will cost approximately \$10,000 a year to finance such a consultant and is asking the various electric railway members of the Council what they think of the plan and how they believe the amount could best be raised.

Public Hearing on Louisville Ordinance

Before action is taken on the bus franchise ordinance Mayor Harrison of Louisville, Ky., will ask the General Council to conduct a public hearing on the measure. The ordinance was released by Mayor Harrison on Feb. 4 and was scheduled for introduction in the lower board at the regular meeting of the General Council on Feb. 7.

The new draft of the ordinance is said to have the approval of the Louisville Railway officials, and unless there is serious objections from the public the measure is expected to pass the Council in its present form.

The ordinance insures a straight seven-cent fare for bus and street cars with interchangeable transfers from rail to motor and half fare for children during the remainder of 1928. It gives the Board of Works power to require the purchaser of the franchise to give bus service where a survey to be made shows such service is needed. company's suggested ordinance was digested previously in these columns.

Tarrytown Line

Local fares for transportation of passengers on the White Plains-Tarrytown Line of the Westchester Street Transportation Company, Inc., are as follows:

Ten cents between the New York Central railroad station in the city of White Plains and the westerly boundary line of the village of Elmsford, and 10 cents between the easterly boundary line of the village of Elmsford and the end of the line in the village of Tarrytown, N. Y. The increase in each zone is 5 cents. The new rates became effective on Jan. 30, 1928.

Results with Five-Cent Loop Operation in Seattle

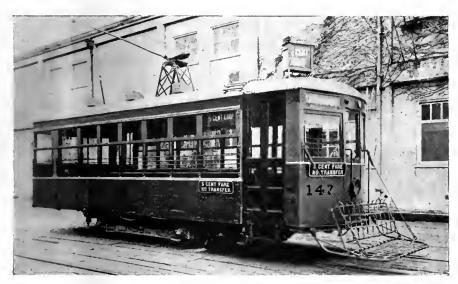
Since the first of the year patronage on the 5-cent city loop lines of the Seattle Municipal Railway, Seattle, Wash., indicates that a worth-while service is being rendered. As the cost of service

Jackson Street as the south terminus, north on First Avenue, to Virginia Street, north on Second Avenue to Pine Street and east to Seventh Avenue, and north on Third Avenue to Stewart Street.

The fare was 5 cents without transfer privileges, or the regular 81-cent token or 10-cent cash fare, if a transfer was desired. Transfers were accepted from other intersecting lines in the usual way.

Due to extreme peak service required in Seattle, several extra men are employed to operate tripper service who do not get a full day's work. These men are guaranteed \$100 to \$135 a month, and on this basis it was figured that the platform time on the 5-cent loop cars would cost little or nothing, since they did not go into service until after 9 a.m., and were out of service before 4 p.m., therefore an extra man could work a tripper and a loop car run, making an eight-hour day.

As shown by the accompanying statement, the patronage increased steadily



A Loop Line car painted in dark red with silver and orange trimmings

is very small if one figures that the platform cost is paid as a guarantee anyway, the experiment will be continued as long as it is warranted.

The installation of a service of this kind was debated for a long time. Finally on Nov. 7, 1927, the Municipal Railway began operating ten cars; three on First Avenue, four on Second Avenue and three on Third Avenue over a limited route. These were light-weight Birney one-man cars, and operated from through the Christmas shopping period. but declined during the week following Christmas. This of course was anticipated, but as stated before patronage has picked up since the first of the year.

During the first few weeks of operation, checks indicated that there was not enough patronage on First Avenue to warrant continued service on that street, so the First Avenue line with its three cars was discontinued on Jan. 2, 1928.

Operating

Plat-

RESULTS OF FIVE-CENT CITY LOOP OPERATION BY THE SEATTLE MUNICIPAL RAILWAY

		3-Cent					I Otto		Operating		2 1110
		Cash	School	81-Cent	Dead-	Trans-	Passen-	Total	Cost Less	Car	form
	Cash	Fares	Fares	Tokens		fers	gers	Revenue	Depreciation	Hours	Wages
First week, Nov. 7-12, 1927	\$432.85	8,657	3	324	821	567	10,372	\$459,92	\$650.16	378	\$287.28
Second week, Nov. 14-19, 1927		10,390	20	385	599	52 7	11,921	552.44	670.80	390	296.40
Third week, Nov. 21-26,† 1927	424.95	8,499	3	323	541	566	9,932	451.94	559.00	325	247.00
Fourth week, Nov. 28-Dec. 3, 1927	529.35	10,572	27	375	432	646	12,052	560.6 7	670.80	390	296.40
Fifth week, Dec. 5-10, 1927	531.97	10,631	15	371	384	700	12,101	562.91	670.80	390	296.40
Sixth week, Dec. 12-17, 1927		10.827	14	379	455	826	12,501	5 73.31	670.80	390	296.40
Seventh week, Dec. 19-24, 1927					328	656	13,144				
Eighth week, Dec. 26-31.† 1927					258	514	8,504	395,78			
					529	704	10,125	456,67			
			9	397	885	862	11,624	506.64	536.64	312	237.12
Seventh week, Dec. 19-24, 1927. Eighth week, Dec. 26-31,† 1927. *Ninth week, Jan. 2-7,† 1928.	589.27 372.03 425.10	11,774 7,431 8,502 9,469	20 16 16 9	366 285 374	328 258 529	656 514 704	8,504 10,125		670.80 559.00 447.20 536.64	390 325 260 312	296.40 247.00 197.60 237.12

Briefs Filed on Discontinuance of Freight Service in Providence

A brief supporting its petition for permission to discontinue its trolley freight service, which, the company claims, has been operated at a loss, was filed on Jan. 31 by the United Electric Railways, Providence, R. I., with the Rhode Island Public Utilities Commission.

Replying to the contention of opponents to the petition that the appeal should have been made to the Interstate Commerce Commission, the brief sets forth that the federal commission has no jurisdiction over electric railways. The transportation act of 1920, the brief states, specifically excludes street, suburban and interurban electric railways from the jurisdiction of the national body in matters of construction and abandonment. Numerous court decisions, including one by Justice Holmes of the United States Supreme Court are cited to prove that a carrier has a right to discontinue any branch of the service after it finds that the branch is being operated at a loss.

the branch is being operated at a loss. Counsel for opponents of the plan filed a brief charging that the company, at a series of public hearings, failed to show that the business was operated at a loss and failed to show there was no public necessity for the service. The opponents say the freight service is necessary to their business.

Numerous Bouquets for Los Angeles Trainmen

If the Los Angeles Railway, Los Angeles, Cal., received any brickbats in 1927 they have been carefully buried, but the bouquets received live in the pictures of the 400 commended trainmen which cover four pages in the Jan. 30 issue of *Two Bells*, the official paper of the railway. Although the figures show that only 402 men were commended through patrons who made it a point to write to the company, the management distributed 4,275 credits for courtesy. Not all these men had a chance to show their faces in the Bouquet Columns of *Two Bells* during the past year.

By-Laws Printed for Supervisors' Association in Boston

Officers of the recently formed Supervisors' Association of the Boston Elevated Railway. Boston. Mass., include J. M. Patten, rolling-stock and shops, president; J. P. Banks, transportation. vice-president; E. L. Doyle, power, vice-president; Thomas Kivell. maintenance, vice-president, and J. L. Troy, transportation. secretary-treasurer. Article I, section 2. in the by-laws states that the object of the association is to promote acquaintance among the men who comprise the supervisory force of the Boston Elevated Railway. The programs of the meetings are partly informational and partly

entertainment. Up to date the association has held three meetings and has now a membership of about 300. The leaflet giving the list of officers and bylaws has recently come off the press.

Montgomery Street Minus Toonerville and Track

Finis was written to the story of the Montgomery Street line of the Market Street Railway, San Francisco, Cal., on Jan. 20 when pretty Miss Clarice Champion wielded the last pick stroke. It was a significant movement for it meant the scrap heap for the Toonerville Trolley, which rattled down that thoroughfare until last October when the line died. On the day of the last run many mourners gathered and blocked traffic, causing a bigger jam than the hushed dinkies which were

fire. And there were two of the ultramodern street cars that run on Market Street and thereabouts, but that have never dared the trick tracks of Montgomery Street before.

And now three months later the track is yanked up and Montgomery Street is bare of a railway. Miss Champion did

a big job!

Commission Opponents Seek Office in Indiana

Already'two well-known politicians, both opposed to present utility laws, are in the field for the nomination for Governor of Indiana, on their respective tickets, Frank Baker, an Indianapolis attorney, is a candidate ou the Democratic ticket. He favors the abolition of the Public Service Commission. One of his latest activities in public utility matters was as a rep-



Mayor Rolph of San Francisco piloting last car over trick tracks on Montgomery Street

accused of choking this "Wall Street of the West."

There were bands and speeches and flags and decorations, and serpentine and ticker tape and snowstorms of paper fluttering down the canyon that is Montgomery Street. And through it wound a strange procession of transportation, with the last of the Montgomery Street "Toonervilles" piloted by none other than Mayor Rolph.

The parade of street cars from the old horse-drawn car to the most modern car built by the Market Street Railway started at Leavenworth and Posts and followed the route of the Toonerville trolley as far as the Russ Building on Montgomery and California Streets.

There was an old stage coach in the lead—right behind the band wagon, that is whence the Municipal band furiously tooted "The Stars and Stripes Forever." Then came the last of the "dinkies," with Mayor Rolph in a Palm Beach suit and a trick motorman's cap at the controller. Behind it came an old-fashioned horse car. There was also an old cable car that hadn't been out on the street since before the

resentative of the union in its contest with the Indianapolis Street Railway a year ago, for more wages. During the struggle cars were dynamited.

Alvah J. Rucker, another Indianapolis attorney, is a candidate on the Republican ticket. He recently was corporation counsel for Indianapolis. While he hedges on an out-and-out stand for the abolition of the Public Service Commission, he states that he believes the utility regulation laws should be changed so that the municipalities have more to say.

To Guide You on Your Way in Baltimore

The United Railways & Electric Company, Baltimore, is distributing 500,000 copies of a new street car directory. A map showing all street car and bus routes in the city is on one side. This also shows the points of interest in Baltimore. A complete list of all the changes that have been made in routes is given and a complete schedule of the various lines.

Paving Discussed at Conference

The question of relieving electric railways in cities of the necessity of paving between their tracks and two feet outside was a leading topic at the midwinter meeting of the New York State Secretaries of Chambers of Commerce Conference held in Rochester, N. Y. The matter was brought before the conference by William J. Russell, secretary of the Queens Borough Chamber of Commerce, who urged that the railways be relieved of this cost by legislative action. The present law, he said, placed "an unjust burden both on street car riders and companies."

Mr. Russell urged adoption by the State Legislature of a bill that would relieve the companies of such paving cost except for 8 or 9 inches on the sides of the rail. Similar bills had been killed in previous sessions, he declared, because of opposition in the State Mayors' Conference. He suggested that if the smaller cities objected to the measure, it be made to apply to cities

of the first class only.

The conference took no action on the proposal although it was the subject of lengthy discussion. G. C. Lehmann, secretary of the Buffalo Business Federation, suggested equitable fares as the solution of the paving problem. The people of his city, he said, did not object greatly to a 10-cent fare because the International Railway had, at the time the fare was boosted, started an extensive paving program in collaboration with the city and the public felt the street improvements offset the higher fare.

Suggestions and Complaints to Go Before Bureau

A special bureau for the receipt of complaints about service and suggestions for improvements or changes was recently established in Omaha, Neb., by J. N. Shannahan, president of the Omaha & Council Bluffs Street Railway.

Recommendation on Phoenix Rehabilitation

A report on bids submitted on Jan. 18 for rehabilitation of the municipally-owned railway system at Phoenix, Ariz., and a recommendation by City Manager Henry Rieger that the bid of the Claude Fisher Company, Los Angeles, be accepted and the contract awarded to it, have been submitted to the City Commission.

Mr. Rieger's recommendation was based on the fact that the Claude Fisher bid is considerably lower than the next best bid, there being a difference of more than \$92,000 between that bid and the one submitted by Schmidt & Hitchcock, the next low bidder.

The tabulated report on bids, prepared by City Engineer W. J. Jamieson and his staff, shows that only two bids of the 28 submitted were based on rehabilitation of the entire system. These were received from Schmidt & Hitchcock, Phoenix contractors, whose total aggregate bid was \$706,381, and from the Claude Fisher Company, whose total bid was \$614,113.

Higher Fares Sought in Springfield

The Illinois Power Company, Springfield, Ill., has petitioned the Illinois Commerce Commission for an increase in railway and bus fares. It feels this is the only solution of the problem following the refusal of the city to relieve the company of paying a 4 per cent franchise tax.

A Pass for an "Ad" in Pittsburgh

Sell what you have to sell! Buy what you have to buy! Here's a weekly bargain pass thrown in for good measure! Virtually that is what Pittsburghers were told recently when they visited the new Sun-Telegraph want-ad corner at Fifth and Market Streets. A little prepaid want-ad for three consecutive insertions meant the acquisition of a weekly pass worth \$1.50, good on the lines of the Pittsburgh Railways.

With the advent of the new year the Pittsburgh Sun-Telegraph opened a new want-ad headquarters and as a publicity stunt arranged to give the weekly pass to each person who placed a three-time want-ad with the paper. The railway agreed to allow the paper 10 cents rebate on each pass in return for the publicity which it would receive on the

weekly pass sales.

Information is wanting on the buyer of that mole coat to fit a perfect "36" and of the touring car with four new tires and two spares; which bride, or was it a newly-wed couple, that rented the four rooms and kitchenette and what white girl answered the call of the bewildered mother who had two children on her hands and unable to do anything with them? All these the nuclei for absorbing short stories from real life!

Whether there was material aplenty for the imaginative mind at least there were customers enough to engage the services of the want-ad specialists who were in readiness to interview prospective advertisers who visited the Sun-Telegraph want-ad corner during the day, after the movies and between shopping tours. The first week 846 passes were distributed and the second week 1,100. Mr. Foster, the want-ad man commented very favorably on the stunt. While the total sales of weekly passes did not show any noticeable increase valuable advertising was gained for the railway property.

Punishment for Portland Car Bandits

Three street car bandits who held up and robbed several conductors of the Portland Electric Power Company, Portland, Ore., last November, have been sentenced to ten years in prison.

Seattle Appeals to Mr. Von Herberg

Declaring litigation against the city of Seattle, Wash., and the Puget Sound Power & Light Company, instituted and maintained by J. G. Von Herberg had adversely affected the marketability of railway bonds and delayed improvements in the railway system, the City Council has asked Mr. Von Herberg to withdraw his suit.

In reply Mr. Von Herberg said:

Let Mr. Leonard state definitely the conditions upon which he will agree to extend the payment period on the street railway purchase bonds.

A. W. Leonard, president of the Puget Sound Power & Light Company, has repeatedly declared that the only basis upon which his company would consider any extension of the time for paying off the purchase bonds would be contingent upon agreement by the city to reduce from 1 cent a kilowatt-hour to ½ cent, the price paid the city light department for current used by the municipal railway. City officials have been hopeful that Stone & Webster would consent to an arrangement whereby the remaining \$10,000,000 in purchase bonds can be paid off in \$500,000 annual installments instead of \$833,000, the amount now paid annually.

New Group Insurance in Atlanta

Accident and heath insurance is being offered all employees of the Georgia Power Company, Atlanta, Ga., who work on an hourly basis. Through an arrangement with the Metropolitan Life Insurance Company the Georgia Power Company will pay part of the premiums on all insurance, provided 75 per cent of the total number of employees eligible avail themselves of the opportunity. The insurance provides payment for sickness or accident regardless of whether or not the sickness or accident is incurred while on duty. It is offered without medical examination regardless of age, sex, or physical condition. As soon as the insurance becomes effective the employees relief association will be disbanded.

Preliminary Report on New York's Suburban Transit Plan

Anticipating the completion of a comprehensive plan on suburban transit for the metropolitan district of New York, the Suburban Transit Engineering Board has submitted its preliminary report as of Jan. 11, 1928. In 36 pages the report covers the subject of the problem, localizing it in New Jersey, Westchester and Long Island and then going on to the tentative results following the formation of the Suburban Transit Engineering Board. Tentative results deal principally with peak hour travel for passengers delivered inbound by the railroads from Westchester and

Long Island to Manhattan. This analysis shows that during the most congested hour of the day by far most riders are destined for the terminals located in Manhattan and use additional subway service or clevated facilities to complete their journey.

Preliminary reports are included of the New Jersey sub-committee, Westchester sub-committee and Long Island sub-committee. It is the hope of the board that after careful consideration and exhaustive analyses of data submitted a comprehensive plan will be submitted at the earliest possible date.

Insurance Policies as Gifts Distributed in Gary

Christmas gifts in the form of life and total disability insurance policies totaling \$66,600 in principal amount were distributed in December, 1927, to employees of the Gary Railways, Gary, Ind. Twenty-three employees who have been in the company's service for more than six years received paidup policies of \$1,500, and ten others in the service more than four years received paid-up policies of \$1,000.

All other employees who had been with the railway for periods from six months to four years received policies of from \$500 to \$900 each. This is a Christmas bonus plan followed by the company for several years. Under it employees can take out additional insurance at low group rates.

group rates.

J. M. Yount of Market Street Railway Wins \$100

The first prize of \$100 for the best articles on advancement in efficiency, accuracy and economy in operation at the Byllesby properties has been awarded to J. M. Yount, vice-president in charge of maintenance and equipment of the Market Street Railway, San Francisco, Cal. Last May it was announced in Byllesby Management that three cash prizes would be available to the authors of original articles appearing in the magazine during 1927 which best tended to show these points. Mr. Yount's discussion on street car maintenance and construction appeared serially in Byllesby Management during January, February, March and April.

Sixty New Members in Portland's Twenty Year Club

J. G. Mann, superintendent of the Piedmont carhouse of the Portland Electric Power Company, Portland, Ore., was made honorary president of the Twenty Year Club at the annual banquet and party held by the members at the Elks' Club on Jan. 18. He succeeds the late Frederick V. Holman. Sixty new members were voted into the club, the membership of the club now totals 374, all of whom have been with the Portland Electric Company twenty years or more.

Recent Bus Developments

Another Substitution by Morris County Line Approved

Substitution of buses for trolley cars by the Morris County Traction Company between Maplewood and Newark, N. J., was sanctioned on Feb. 1 by the Public Utilities Commission. The approval is subject to condition designed primarily to preserve the line as an express service from Newark to Maple-

wood and Springfield.

Only a limited number of stops will be permitted in Newark for the purpose of taking on passengers. The fare will be 20 cents, which, the commission points out, will eliminate use of the buses as a local service in Newark. The application was made by Joseph K. Choate and Joseph L. Tumulty, as receivers for the railway, for approval of municipal consents to operate buses through Maplewood, Springfield, Irvington and Newark.

By a decision last August, the board approved the substitution of buses for cars over the portion of the route from Newark to Lake Hopatcong, including intermediate municipalities. Municipal consents were obtained for the operation of twelve buses in Newark and for the operation of buses in Springfield and Maplewood. The rate of fare proposed and sanctioned is 20 cents from Newark to any point as far as the Passaic River Bridge, the boundary between Summit and Chatham.

Objections were interposed to approving the municipal consents by the Somerset Bus Company, the B. & N. Transportation Company and the De-Camp Bus Lines, Inc., together with other independent operators. Inasmuch as the operation of buses is only a substituted service, the board deemed it imnecessary to impose numerous restrictions asked for by objectors whose lines had been established only within recent years.

Bus Matter in Knoxville Goes Over to April

There will be no action until the meeting of the Council in April on the proposal of the Knoxville Rapid Transit Company, Knoxville, Tenn., to establish bus service there in competition with the railway lines of the Knoxville Power & Light Company. This postponement of consideration of the matter is the result of action by the service and the law committees of the Council. By that time it is expected the survey being made by associates of Harland Bartholomew, engineer for the planning commission, will be ready. Councilman Wright said:

We will all admit that Knoxville needs more transportation routes and facilities, but we all know equally well that the ques tion of bus transportation is new to us. I believe we could all learn a great deal by awaiting the Bartholomew transit report. We shall all then know better how to decide this question.

Jitney Buses Compete with Oklahoma Railway

Jitney buses have started on one route in Oklahoma City, Okla., in competition with the Oklahoma Railway. The company will test the right of its competitor to operate, claiming that the federal injunction secured two years ago against rival bus lines is still operative. City authorities state the City Council has not approved operation of the rival line.

Terminal Planned for Philadelphia

The Philadelphia Rapid Transit Company announces that it intends to use the old public school building site at Fifteenth and Locust Streets for a terminal for its own buses with facilities for the parking of private automobiles. It also has plans for a garage and bus terminal near the northern end of the Broad Street subway. This project is to serve the same purposes which are performed in part by the parking areas in West Philadelphia and in Frankford. The terminal will cost \$2,000,000. It will be equipped to take care of buses, taxicabs and automobiles. Surface cars and motor bus feeders will loop the proposed terminal at the northern end of Broad Street.

Perfect Safety Scores in Youngstown

Thirty-three drivers of the Pennsylvania-Ohio Coach Lines, a subsidiary of the Pennsylvania-Ohio Electric Company, Youngstown, Ohio, had perfect safety records in the second half of 1927. Not one had a chargeable accident. Twenty-two of these men had perfect scores for the entire year. Eight others, some of them in the service less than six months, went throughout the last three months of 1927 without a chargeable accident. Gold buttons will be presented to the men who had no accidents during the year and certificates to those who had no accidents in the six-month period.

Stage Service for Orange Show in San Bernardino

The Pacific Electric Railway has applied to the California Railroad Commission for authority to operate auto stage service from the Pacific Electric station at San Bernardino to the National Orange Show Building in that city during the period of the show each year.

Financial and Corporate

Deal for Indianapolis-Cincinnati Road Reported

William L. Taylor, attorney for the Central Union Trust Company, New York, trustee of the bonds of the Indianapolis & Cincinnati Traction Company, Rushville, Ind., has confirmed the report that a deal for the property is under consideration. According to Mr. Taylor, C. T. DeHore and associates, Toledo, are seeking to purchase all outstanding bonds of the company and its subsidiaries, following which they would bid the property in at foreclosure as bondholders. The property has been in receivership for three years.

The company owns and operates 104 miles of main electric interurban track between Indianapolis and Connersville and Indianapolis and Greensburg, Ind. It owns its own power plant and its own right-of-way between these cities. It is understood that Mr. DeHore and his associates plan to extend the line to Cincinnati. The road was built by

the late Charles L. Henry.

Kentucky Railway Included in Deal

Sale of the controlling interest of the Kentucky Power Company and the Maysville Public Service Corporation and their subsidiaries to the United Public Service Company, Chicago, has been confirmed by Barrett Waters, president of the Kentucky Utility Companies. The properties, which supply power to the greater part of Northern Kentucky and include the Maysville Street Railroad & Transfer Company, Maysville, Ky., and the Kentucky Engineering Company, the latter at Augusta, are valued in excess of \$4,000,000, according to Mr. Waters.

Hearing on Kansas City Bonds Concluded

Arguments on the appeals filed by second mortgage bondholders of the old Kansas City Railways, Kansas City, Mo., which was purchased by the Kansas City Public Service Company from the order lifting the receivership in June, 1926, were recently concluded in St. Louis before the United States Circuit Court of Appeals.

The appeals were based on the objections of the second mortgage bondholders and the preferred stockholders. They contended that the federal court order turning over the property to private ownership failed to give them a fair representation in the new company on the basis of their securities in the

Blatchford Downing declared no provision was made in the reorganization plans for either the holders of \$5,-

000,000 of second mortgage bonds of the old company or for the stockholders. He declared that the provisions made by the reorganization plan for first mortgage stockholders and unsecured creditors holding damage claims amounting to more than \$2,500,000 who were practically paid in full, was in effect a diversion of the funds due the holders of second mortgage bonds and the stockholders.

Increase in Preferred Stock of Philadelphia Rapid Transit

The Philadelphia Rapid Transit Company will shortly apply to the City Council for the right to issue \$5,000,000 of 7 per cent preferred stock. \$1,500,000 of this money will be used to put the Market Street subway tracks straight through under City Hall. About \$2,000,000 will be used for a bus, taxicab and automobile-garaging terminal at Fifteenth and Locust Streets. About \$1,500,000 will be used for a garaging terminal at the Olney Avenue end of the Broad Street subway, where provision will be made for street cars, buses, taxicabs and automobiles.

Gross Revenue of Chicago Surface Lines Higher in December

In spite of a decrease in total passengers carried, gross revenue of the Chicago Surface Lines was higher in December, 1927, than for any other month last year. The gross earnings of the system last December were \$5,365,172 compared with \$5,133,348 in November and \$5,417,666 in December, 1926. Due to a reduction in operating expense the divisible receipts in December exceeded both those of November and December 1926.

Revenue passengers handled in December, 1927, totaled 137,135,000, a decrease of 390,088 compared with rides reported for December, 1926. During the week before Christmas, 1927, there was a gain of 2,500,000 passengers over the number carried in the similar week of 1926.

Another Loan Bill Appears in Seattle

A temporary loan of \$550,000 to the City Railway fund from the Municipal Light Extension bonds 1926 construction fund is provided in a bill introduced at an adjourned meeting of the City Council of Seattle, Wash. A bill providing for a temporary loan of \$400,000 from the light fund to the City Railway fund was introduced at an earlier meeting of the Council. Both bills are now in the hands of the finance and the city utilities committees.

Maryland Commission Values Easements

Explains means of determining allowance to be given to this form of property of Baltimore Company

AS MENTIONED in the ELECTRIC RAILWAY JOURNAL for Feb. 4, the Maryland Public Service Commission has placed a valuation of \$5,000,000 on the "easements" of the United Railways & Electric Company, Baltimore. The publication of the full opinion shows how the body reached this valuation. The term "easements," as used in

Baltimore is somewhat unusual. An extended explanation of the meaning of the term was given by the late W. G. Maltbie, special counsel of the company, on page 74 of the issue of this paper of Jan. 9, 1926. Briefly, it means a tangible interest which the company owns in the space on the streets occupied by its cars while in operation. Under the Maryland law the easement value is distinct from and in addition to the franchise value, or the right of the company to operate cars. The Maryland courts have held that such easements are property and subject to taxation. The company naturally claims that their value should be included in valuations for rate-making purposes.

Originally the company placed the value of its easements and private rights-of-way at between \$18,000,000 and \$19,000,000. This figure was cut by the Maryland Public Service Commission to \$7,000,000, but on the claim of the people's counsel, this figure was disallowed by the Maryland Court of Appeals on the ground that it has been fixed, at least in part, on the basis of the earnings of the property. method, the court held, was erroneous because: "The greater the earnings, the larger the value of the easements. The greater the value of the easements, the larger the fare returns that must be allowed on such value." The case was therefore remanded for determination without consideration of this element.

In announcing its revised value of \$5,000,000 the commission explains the method by which this figure was determined and points out that earning capacity is in no way a factor. Briefly, the easement strip is considered as real estate and its value determined by comparison with that of adjacent real To this value, a so-called percentage-use factor is applied, on the theory that while the cars use the streets, other vehicles do also. percentage-use factor by the railway is taken as 25 per cent where the rights of the company are not exclusive. In this way a total of \$5,113,632 was obtained as the approximate value of easements and private and semi-private rights-of-way. For the purposes of the present valuation this sum was taken as \$5,000,000. As the commission had previously found the value of the property, exclusive of easements, was \$70,000,000, as of Dec. 31, 1923, it placed the total value of all property, including easements, at \$75,000,000 as of the date mentioned.

Counsel Attacks Holding Company Plan at St. Louis

Former Judge Henry S. Priest, counsel for the Tilles Non-Sectarian Foundation Fund, a minority stockholder of the St. Louis Public Service Company, on Jan. 23 asked the Missouri State Public Service Commission for permission to intervene in the hearing on the application of the City Utilities Company for permission to hold more than 10 per cent of the stock of the railway.

Mr. Priest, formerly counsel for the defunct United Railways, in a letter to City Counselor Muench assailed the explanation given recently by Stanley Clarke, executive vice-president of the railway, that the holding company could greatly aid the operating company in financing and other problems as an "impeachment of the local management," and further said that explanation of financial aid was ridiculous. Mr. Priest said:

Its resources are invested in the stock of the domestic company, and if the direct obligation of the domestic company, supported by all its assets were not available for credits, surely its shares of stock alone would not be appealing.

On its face it appears to be a device for pensioning some of the favorites of the foreign corporation at the expense of the

domestic company.

City Counselor Muench of St. Louis, Mo., in a motion filed with the Missouri Commission charged that if the application is granted the holding company could obtain virtual control of the operating company and create obligations of its own with the stock and securities of the St. Louis Public Service Company as collateral without any supervision from the commission or other Missouri officials.

Sale of Electrical Equipment Approved

Stockholders of the Stark Electric Company, Alliance, Ohio, approved proposed action of the company's directors to sell electrical equipment to the Alliance Power Company, at an annual meeting held at Alliance. Approval was given after the stockholders had heard an optimistic report on 1926 operation. The sale has been approved by state officials.

Foreclosure Case at Chicago to Be Pleaded in June

Recent reports that foreclosure proceedings will be initiated against the Chicago Railways were confirmed on Jan. 21, when James H. Wilkerson, judge of the Federal District Court of Chicago, instructed attorneys for the company and for the various security holders' protective committees to be prepared to plead their cases at a trial next June. The Chicago Railways operates the north and west side surface lines. It has been in receivership under the jurisdiction of Judge Wilkerson's court since its twenty-year franchise expired last February and the

payment of principal and interest on its bonds was defaulted. Henry A. Blair, J. J. Mitchell and Fredrick Rawson were appointed co-receivers at that time by the federal court.

The suit will not interfere with the franchise negotiations between the Surface Lines and the city, according to Attorney H. K. Tenner, who represents the Chicago Railways first mortgage bondholders.

Two New Directors Added to West Penn Electric Board

At meetings of the boards of directors of The West Penn Electric Company, West Penn Power Company and West Penn Railways, held on Dec. 7, 1927, W. C. Robinson, Pittsburgh, was elected a director. Mr. Robinson is president and a director of the National Metal Molding Company and is also a director of The Union Trust Company of Pittsburgh and the Mellon National Bank.

At a meeting held in New York on Jan. 4, 1928, Thomas H. Blodgett was elected a director. Mr. Blodgett is president of the American Chicle Company, New York.

Progress Reported on Washington - Merger Negotiations

Negotiations for bringing about a merger of the Washington Railway & Electric, the Capital Traction and the Washington Rapid Transit companies have been resumed by committees representing the three companies and their counsel.

It has been emphasized that a merger of the Potomac Electric Power Company with the railway utilities is positively forbidden by an act of Congress and its consolidation with the railway companies, therefore, has never been discussed in the conferences.

Sale of Morris County Traction Confirmed

Federal Judge Runyon has confirmed the sale of the property of the Morris County Traction Company to its bondholders for \$280,000. The railway, since replaced by buses, was sold under foreclosure at Morristown on Oct. 31, 1927.

Following the purchase, negotiations were consummated with the Public Service Transportation Company to replace the trolleys with buses, and this service between Newark and Morristown, was started Feb. 5.

The Public Service, it is said, will become owner and operator of the line.

New Director in Columbus

Lyle Babbitt has succeeded H. S. Holton as a director of the Columbus Railway, Power & Light Company, Columbus, Ohio.

Baltimore Company Passes Dividend to Conserve Cash

Directors of the United Railways & Electric Company, Baltimore, have passed the current quarterly dividend. It was explained by Charles D. Emmons, president of the company, that the action was taken because the dividend was not fully earned, the surplus in 1927 applicable to dividends being equivalent to \$1.17 a share, while the disbursement called for \$2 a share. The amount available for dividends was \$682,000, or \$136,446 less than the amount required. During the year ended Dec. 31, 1926, the dividend was sarned by the company with \$196,606 to spare.

President Emmons pointed out that the company's operating costs, materials, wages and taxes have doubled since before the war while fares have increased less than 50 per cent. The public pays twice as much for nearly everything it uses, he said, but this is not true of car fares. He said:

The company tried to live on a lower fare, but additional increased costs, accompanied by falling off in traffic, compelled the company to apply for relief to the Public Service Commission. The rate case was necessarily, in the public interest, a long and exhaustive one before relief could be granted, and it became necessary to take the action we did.

The statement of income of the company for the year ended Dec. 31, 1927, before adjustment of books for both 1927 and 1926 is as follows:

	1927	Increase
Passenger revenue	\$15,956,013	\$527,909
Other revenue	233,727	1,941
Totals	\$16,189,741	\$525,967
Operating Expenses:		
Way and structures	\$841,535	817,328
Equipment	907,550	1.136
Power	1,387,832	63,984
Conducting transportation	5,143,117	71,305
Traffic	15,474	11,136
General and miscellaneous.	1.535.354	12,058
Transferred for investment	.,,,,,,,,	1020
Cr	16,025	1,445
	\$9,814,839	\$131,99
Depreciation	809,487	26,298
Totals	\$10,624,326	\$158,295
Net operating revenue	\$5,565,415	\$367,67
Taxes	1,593,143	95,255
Operating income	\$3,972,271	8272,421
Non-operating income	159,230	34,086
Gross income	\$3,131,502	\$238,33
Fixed charges	2,889,315	64,42
Remainder	\$1,242,187	\$302,762
Interest on income bonds	560,000	
Net income	\$682,187	\$302,762

Italies denote decrease.

Balance of New York State Railways \$308,565

"I firmly believe that conditions will improve from now on and that securities of conservatively operated traction lines serving the larger municipalities will again gain favor with the investing public." With these words did James F. Hamilton, president of the New York State Railways, Rochester, N. Y., submit the annual report to the stockholders. The balance for the year ended Dec. 31, 1927, for dividends and surplus, as shown in the accompanying report, was \$308,565 against \$497,403 for the year previous.

SUMMARY OF OPERATIONS OF THE NEW YORK STATE RAILWAYS— YEARS ENDED DEC. 31

1927 ,879,150 ,058,067	1926 \$10,351,484 7,263,755
	\$10,351,484 7,263,755
,821,083 596,565	\$3,087,728 659,422
224,517 122,955	\$2,428,306 37,698*
347,472	\$2,390,607
,290,294	\$1,292,994
218,086	243,606
,508,381	\$1,536,601
839,090	\$854,006
\$30,525 500,000	\$31,603 325,000
530,525	\$356,603
	\$497,403
	,508,381 8839,090 \$30,525

The company entered into an agreement with the City of Rochester to operate the new subway railroad constructed by the city at a cost of upwards of \$12,000,000. Under the terms of this contract the company is to provide the necessary rolling stock for passenger and freight service and pay the cost of operation and maintenance, after which any surplus or deficit is to be applied as provided in the existing service-atcost contract which governs this service. The city assumes all interest and

COMBINED SUMMARY OF OPERATIONS OF AFFILIATED BUS COMPANIES OF NEW YORK STATE RAILWAYS— YEAR ENDED DEC. 31, 1927

Gross revenues	\$601,362 532,968
Net operating revenue Taxes	\$68,393 13,129
Operating income Deductions	\$55,264 18,613
Available for depreciation and surplus	\$36,650

other fixed charges including taxes. In conjunction with this arrangement, agreements are being entered into with the various steam railroads entering the city providing for the movement of freight cars to and from commercial sidings located on the subway railroad

and also the transfer cars from one railroad to another.

In order to protect its interests and to avoid heavy expenditures incident to the construction of track extensions necessary to supply demands for service in outlying districts, the New York State Railways started auxiliary bus service to supplement and extend its trolley service in and about the cities in which it operates. The company's investment in bus lines amounted to approximately \$650,000 on Dec. 31, 1927. In addition to furnishing service to outlying districts the establishment of cross-town bus lines in the City of Rochester has permitted the discontinuance of unprofitable long-haul trolley operation without loss of traffic. The revenues from operation of buses amounting to \$600,000 are not included in those of the New York State Railways but are set out in a separate statement.

Due to the company's inability to finance capital expenditures through the issue and sale of its securities it has been necessary for several years past to use all available funds for that purpose, and this accounts for the deferment of dividends on the company's preferred stock.

The report referred to the enforcement of more stringent parking regulations in the business centers and said this must react to the benefit of city railway lines. Mr. Hamilton also mentioned the possibility that the present paving law would be amended to relieve the electric railways of at least part of this unfair burden.

3.91 Miles in New Hampshire to Be Abandoned

The New Hampshire Public Service Commission has granted authority to the Massachusetts Northeastern Street Railway to abandon 3.91 miles of track in Plaistow and Newton. Unprofitable operation was claimed.

Kansas City Bonds For Sale

The Kansas City Public Service Company, Kansas City, Mo., has applied to the Missouri Public Service Commission for authority to issue \$2,-634,000 of first mortgage gold bonds, series A. These are to be sold for not less than 88 per cent of par value and the proceeds will be used to refund obligations of the company.

Subscribers in Providence From Ranks of Employees

Employees of the United Electric Railways and the Narragansett Electric Company, Providence, R. I., have subscribed to \$701,700 or 6 per cent cumulative preferred stock in the New England Power Association. The subscription price was \$100 per share. Employees will pay in installments of \$2 a share per month, deducted from the subscriber's salary.

Would Discontinue Line in Santa Barbara

The Santa Barbara & Suburban Railway has applied to the California Railroad Commission for permission to discontinue operation of its State Street bus line run in the city of Santa Barbara.

Collateral Trust at Chicago Reports Loss

The Chicago City & Connecting Railways Collateral Trust, Chicago, Ill., reports for the year ended Dec. 31, 1927, net loss of \$1,077,844 after charges. This loss is due to the fact that with the expiration of their franchise, the Chicago City Railway and the Calumet & South Chicago Railway stopped payment of dividends on Feb. 1 last. B. E. Sunny, chairman of the protective committee, states the companies have set aside for the benefit of stockholders the equivalent of the dividends not paid.

Stock Reduction in Wisconsin Company

An 80 per cent stock reduction was voted at the annual stockholders meeting of the Wisconsin Rapids Street Railroad, Wisconsin Rapids, Wis.

Earnings of Eastern Massachusetts Fluctuate

Receipts of the Eastern Massachusetts Street Railway, Boston, Mass., last December were almost \$100,000 less than in the corresponding month in 1926, whereas the receipts in December, 1926, were about \$95,000 higher than in December, 1925. Last December there was no snow, so that the company had no snow expenses, but people were operating their automobiles and did not use the street cars. During December, 1926, however, there was so much snow that automobiles were not used to the usual extent.

During 1927 the Eastern Massachusetts earned its dividend requirements on the first preferred and on preferred B stock, but failed by about \$93,000 to earn the \$5 a share paid on the 86,842 shares of adjustment stock, so that the net available for dividends on this issue was only \$4 a share. The net income of \$772,060 available for dividends in 1927 was greater than that of either of the two preceding years. Operating revenues decreased \$190,000, but there was an increase in net of \$37,000 over the previous year.

New Director on Atlanta Board

Andrew C. Erwin was recently elected to the directorate of the Georgia Power Company, Atlanta, Ga., to succeed the late J. P. Phinizy. Mr. Erwin is a prominent business man of Athens. He is well known in the public affairs of the state.

Book Reviews

In Retrospect

Conspicuous in the land of books in 1927 affecting public utilities was the production of reading matter relating to finance. This, of course, is indicative of the present day need for a thorough understanding not only on the part of utility managements but also on the part of the layman of the principles involved in speculation, stock ownership, profit sharing, accounting practices, and depreciation. One brave ameliorist, Professor William Z. Ripley, caused a stir with his "Main Street and Wall Street" (Little Brown & Company). However, he is no more intent upon rectifying certain corporate practices than are many exponents of the industry itself. From his comments something can be gleaned. Again, much can be gained from a perusal of 'The Principles of Bond Investment' (Henry Holt & Company) by Chamberlain and Edwards. This work is popularly known as "The Bible of Wall Street." Here is finance brought up to date after a trying period of war, radical changes in the taxation system and the wholesale weeding out of passé stock.

"The Claim Agent and His Work" by Smith R. Brittingham (Ronald Press Company) deserves the attention of electric railway managers. But by far eclipsing the rest of the crop in volume, interest and perspective is Martin G. Glaeser's "Outlines of Public Utility Economics" (Macmillan Company) with its comprehensive task of presenting the economic problems of all of the public utilities taken as a group. The author is a professor of economics at the University of Wisconsin and research associate, Institute for Research in Land Economics and Public Utilities.

In addition to the volumes covering general engineering subjects, business conditions, wages, employment, economics and the like, there were a few which appealed to popular fancy in the industry. For his observation on the American workman, the reviewer reached a rapprochement with André Siegfried in "America Comes of Age" (Harcourt, Brace & Company). protagonists of American industry would find both pleasure and enlightenment in this discerning Frenchman's views. The story of business a generation ago with its unbridled rivalry is told in "Captains in Conflict" (A. W. Shaw Company). Here is an epoch in business in the making which might serve as inspiration to the present-day leaders.

Another book in somewhat lighter vein is Frank Folupa's "Notes on the Collection of Transfers" (Dorrance & Company). The reader may not be a "peridromophile," but he would probably be amply repaid for time consumed on reading about the habit of collecting transfers.

These books and numerous others were reviewed in the ELECTRIC RAILWAY JOURNAL in the second issue of each month, during the past year. Reference can be made here to only a few of them, but it has been the desire to satisfy all types of readers. In some respects the task was as difficult as that which confronted the essayist who was to pick stories to please three old ladies at one and the same time. The first lady was practical, the second was fond of fun and the third was romantic.

Heinrich Bussing und Sein Werk

(Henry Bussing and His Work)—25th anniversary publication, by the Automobilwerke, H. Bussing A. G. Braunschweig, Germany, 92 pages of text and 262 illustrations.

Mr. Bussing's work during the past twenty-five years has been the manufacture of buses and commercial cars. So well has he done this work that his name is known throughout Europe and only to a lesser extent in America. The present volume is in part historical and in part relating to the Braunschweig Works. Most of the book, however, is devoted to particulars of recent designs which vary all the way from ice wagons to luxurious double-deck touring buses. The book is beautifully printed and bound.

Five Thousand Sheet Steel Products and Who Makes Them

Sheet Steel Trade Extension Committee, Pittsburgh, 445 pages, price \$3.

The book is essentially a directory of sheet steel products and fabricators. The compilers of it advise that "heretofore there has been no publication of any kind to which one could turn to find all of the manufacturers of sheet steel, all of the fabricators of products made from sheet steel, and the names of these products."

The cover of the new book is done in blue, silver and gray. In addition to the preface, the table of contents includes the following: "Brief History of Iron and Steel"; "U. S. Standard Weights and Gages for Iron and Steel Sheets"; "List of Simplified Types, Gages and Size of Sheets"; "Manufac-turers of Sheet Steel with Index to Their Advertisements"; "Fabricators—Alphabetical List of"; "Fabricators—Alphabetical List by States"; "5,000 Sheet Steel Products and Who Make Them"; and "Sheet Steel Products with Index to Fabricators Who Make Them.' The brief history of iron and steel contains more than a dozen illustrations. This useful and handy directory is calculated to find a welcome place in business libraries and on the desks of purchasing executives.

Electric Control Gear and Industrial Electrification

By William Wilson, M.Sc., B.E., M.I.E.E., A.A.I.E.E. Oxford University Press, London, England. 362 pages. Price \$8.50.

Extensive use of electricity for driving shop tools has led the author to compile a volume on the control apparatus itself. Special attention has been given to present the information in such a form as to be understood readily by the type of engineer usually connected with this work. The book, however, is concerned primarily with the design, arrangement and construction of the controlling apparatus. Each chapter as far as possible is complete in itself and can be read and understood independently of those that come before and after. Diagrams used are made easily intelligible.

Readers who are studiously inclined have been kept in mind and certain specialized sections have introductions to familiarize the reader with the subject and so not require reference to other text books.

The book is well illustrated and gives examples of various installations. There are 23 chapters and numerous tables. Chapters on electric crane and control systems for them and upon machine tool control should be of particular interest to electric railway shop men.

Trade Association Activities

Bureau of Foreign and Domestic Commerce, Department of Commerce—Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.,—383 pages—75 cents.

Secretary Herbert Hoover covers the purpose of the government when in the foreword he says that the purpose of this and the 1923 volume on Trade Association Activities is to indicate the successful service of trade associations in public interests. That in the field of scientific and economic research, in statistics, in simplification and standardization of commodities, in the promotion of arbitration in commercial disputes, in development of foreign trade, and in scores of other directions, trade associations have made a valued contribution to economic progress.

The publication discusses in detail the following phases of trade association activities: the organization problems of trade association and the way in which these are commonly met; the legal status of the statistical activities of trade associations; service of trade associations in promoting uniform cost accounting; the encouragement of cooperative research by trade associations; simplification and standardization in industry; public relations and co-operative advertising; trade relations and arbitrations; and a detailed treatment of trade associations in connection with the industries which they represent. The text closes with an outline of the. vast number of contacts which trade associations maintain with the federal government.

Personal Items

A Record Holder

"Bob" O'Brien of New Orleans heads Association of Equipment Men Southern Properties, which he helped to found

ELECTION of Robert M. O'Brien to the presidency of the Association of Equipment Men, Southern Properties, at the recent meeting of that organization in New Orleans marks the elevation to that post of another of the small group of far-sighted Southern equipment men, who in 1922 conceived the idea of organizing to interchange ideas on practices and to compare costs so as to stimulate improvement in their own performance. Mr. O'Brien, New Orleans, joined forces with A. D. Mc-Whorter, Memphis, W. H. McAloney,



R. M. O'Brien

Atlanta, and A. Taurman, Birmingham, and the association was born which has since grown to proportions undreamed

of by its founders.
"Bob" O'Brien has been the storm center of discussion throughout the South ever since he proceeded to romp off with the honors in the Southern Association's pull-in contest. At first there was general scepticism regarding New Orleans' performance. Then the Southern Association adopted a rigid definition of a pull-in, but New Orleans continued to lead by a wide margin. In addition to having what is probably the lowest pull-in record in the country, New Orleans has an equipment maintenance cost that is well down below the average.

One looks in vain for spectacular "stunts" that might explain this performance. There are none, except that for the 39 years "Bob" O'Brien has been with the New Orleans Public Service Company and its predecessors, he has pounded away at the work of gradually developing one central idea regarding the maintenance of electric railway equipment until it has permeated to the lowliest man in his department. "Our business is so to maintain equipment that it will not fail in service-not to

repair it after it has failed," he insists. That's all there is to it, except that Bob stays close enough to the job to see that this idea is put into practice.

"Bob" O'Brien has lived in New Orleans all his life. He is now 54 years old, but he has worked for one company since he started as a lad of fifteen in the power house of the old Louisiana Electric Light Company. After four years he was in charge of the company's meter department as foreman, but in 1893 he went into the Arabella Station of the New Orleans City & Lake Railway as a car doper. In 1894 he became night foreman of the Poland car station. In 1898 he moved up a notch as day foreman. In 1901 the New Orleans Railway & Light Company was formed by consolidation and in 1907 "Bob" became foreman of Claiborne station. A year later he was moved to a similar position in Arabella station, the largest house on the system, and in that same year became inspector of equipment. In another year he became assistant superintendent of the railway, and in 1913 was made superintendent of equipment by M. S. Sloan, then general manager of the property at New Orleans.

The entire department of which he is the head is concerned primarily with maintenance work, but during the past several years a staff of young engineers has been developed in his department to supplement and reinforce the practical maintenance forces. Mr. O'Brien is a firm believer in eliminating all manufacturing activity from a maintenance shop, on the principle that home manufactured parts are false economy. As president of the Association of Equipment Men, Southern Properties, he may be expected to support the principle that since the manufacture of electric railway parts is work for specialists, the operating executive should concentrate on getting the best possible performance from equipment instead of going into competition with the manufacturer, who is trying to help reduce

C. E. Mitten Goes to Philadelphia

Clarence E. Mitten has been transferred to Philadelphia, Pa., to take charge of the new business department of the Philadelphia Rapid Transit Company and associated companies. He has been passenger traffic manager of the International Railway at Buffalo since early last year. In that capacity he handled both electric and bus transportation and reported direct to President Yung-bluth. Mr. Mitten went to the International Railway organization from the Chicago & Eastern Illinois Railroad where he had twenty years of experience. In that organization his last position was assistant superintendent of transportation.

Simon Glerum Is Advanced · at Grand Rapids

At the annual meeting of the directors of the Grand Rapids Railroad, Grand Rapids, Mich., in January a new office was created, and in recognition of twelve years of faithful and efficient service Simon Glerum was chosen for the new place, assistant secretary and assistant treasurer.

Mr. Glerum has filled many positions with the Grand Rapids company. From stenographer in the general offices he advanced until he became private secretary to L. J. DeLamarter, vice-president and general manager. In all of these positions Mr. Glerum has proved his efficiency, loyalty and courtesy, says Mr. DeLamarter. He is well known in the industry.

Mr. Glerum was born in Grand Haven, Mich. He was graduated from the local public schools and was former



Simon Glerum

secretary to Congressman private Carl E. Mapes of Michigan. This early training gave him a good foundation on which to build and his application to his duties with the railway operating in Grand Rapids has commanded the regard of the directors.

East St. Louis Roads Elect

F. W. Doolittle, New York, was elected president of the East St. Louis & Suburban Railway, East St. Louis, Ill., Jan. 24 at the annual meeting of the board of directors in East St. Louis. Other officers elected or re-elected were: G. W. Welsh, vice-president; T. W. Gergory, vice-president and secretary; R. Sealy, New York, treasurer; Lieut.-Col. Frank L. Reardon, assistant-secretary and treasurer; F. H. Piske, New York, assistant secretary; Miss Eugenia E. Sunkel, assistant treasurer. same officers were also named by the directors of the St. Louis & Belleville Electric Railway and the St. Louis & Alton Railway, subsidiaries.

Mr. Doolittle, for a long time vicepresident of the North American Company, which controls the East St. Louis Company, succeeds W. H. Sawyer as president. Mr. Sawyer resigned as president on Oct. 14 to become president of Stevens & Wood, Inc., of New York. Following the resignation of Mr. Sawyer, Mr. Doolittle assumed the duties of president. A biography of Mr. Doolittle was published in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 22, 1927, page 806.

The action taken by the directors of the railways at the annual meeting changes the status of T. W. Gregory, formerly vice-president and assistant secretary; Lieut.-Col. Frank L. Reardon, formerly assistant treasurer, and Miss Sunkel, formerly secretary to Vice-President Gregory.

Mr. Gregory, newly elected secretary, has been with the affiliated companies since 1902. He was appointed receiver of the Alton, Granite City & St. Louis Traction Company in December, 1925, and receiver of the Alton Gas & Electric Company on Dec. 22, 1925.

After his re-election as vice-president of the railways G. W. Welsh was appointed general manager by the president, giving him the title of vice-president and general manager. Mr. Welsh was with the General Electric Company from 1901 to 1905, in the testing department, specializing particularly in electric railway operation. From 1905 to 1909 he was with the New York Central Railroad in connection with the electrification of the Grand Central Terminal in New York City. Subsequently he worked with the Southern Pacific Company, San Francisco, on the electrification of suburban lines on the eastern side of San Francisco Bay, in Oakland and Berkeley. In this endeavor he was employed from 1909 to 1914.

Miss Sunkel was the first woman employee of the East St. Louis railways. She began as assistant cashier 24 years ago. Later she held various posts in the accounting department and has been secretary to Vice-President Gregory for ten years. She will be eligible next year to membership in the Twenty-five Year Club and will be the only woman member of that organiza-

tion for several years to come.

William Stewart at Omaha

William Stewart has accepted the position of private secretary to J. N. Shannahan, president of the Omaha & Council Bluffs Street Railway, Omaha, Neb. Mr. Stewart entered the railway field in 1899 as chief clerk in the signal and maintenance of way departments of the New York Central & Hudson River Railroad at Albany, N. Y., in which capacity he served until 1901, when he accepted a position as purchasing agent and secretary to the general manager of the Fonda, Johnstown & Gloversville Railroad at Gloversville. N. Y. From 1907 to 1912 he was purchasing agent and secretary to the general manager of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md. On Jan. 12, 1912, he was elected secretary and treasurer, as well as purchasing agent of the Newport News & Hampton Railway Gas & Electric Company at Hampton, Va., now known as the Virginia Public Service Company.

Westinghouse Executives Promoted

W. J. Longmore has been transferred from the office of general purchasing agent of the Westinghouse Electric & Manufacturing Company to consulting supervisor of purchases; E. R. Norris, from director of works equipment to general works manager of all manufacturing operations; A. W. Bass, from director of works records and statistics to assistant to the vice-president; S. E. Marks, from director of traffic and shipping to director of traffic; and C. G. Taylor from director of purchases to general purchasing agent.

Mr. Longmore is a veteran of the company, being perhaps the oldest in continuous service. He entered the employ of the Westinghouse interests in

1881 as a laborer.

Mr. Norris began his connection with the company in 1892 as a general mechanist at the Newark works.

Mr. Bass has had a wide experience outside the company. In 1921 he was made director of works records, the position he held until his recent pro-

Mr. Marks entered the employ of Westinghouse in 1891 in the purchasing department.

Mr. Taylor became connected with the Westinghouse Company in 1887.

D. F. Miner has recently been appointed manager of material and process enginering department of the Westinghouse Electric & Manufacturing Company. Mr. Miner was first employed by the company in 1919 as an assistant to the section engineer of the electrical section. Since 1920 he has served in the capacity of section engineer of the experimental section of the material and process engineering department.

Allyn B. Tunis Will Direct Virginia Information Bureau

Allyn B. Tunis will direct the re-cently organized Virginia Committee on Public Utility Information, with headquarters in Richmond, Va. Tunis knows the newspaper and publicity business. He first worked as a reporter on the *Ledger-Dispatch* at Norfolk. Later he became city editor of the Times-Dispatch at Richmond. For two years he was on the copy writing staff of Cecil, Barreto & Cecil, Inc., advertising agents of New York and Richmond. Mr. Tunis served for five years as agent of the Chesapeake & Ohio Railway public relations department.

It was from the copy desk of the Richmond News Leader that Mr. Tunis resigned to take up the duties of secretary of the Public Utilities Association of Virginia and to hold at the same time the position of director of the new information bureau in Richmond.

Mr. Tunis is a native of Maryland. He was born on July 4, 1888.

C. P. BILLINGS, after nine years' service in various capacities with the West Penn System, Pittsburgh, Pa., has sev-

ered his connection with that company to go with the Electric Bond & Share Company, New York City. During his connection with the West Penn Electric Company, Mr. Billings served as vicepresident and general manager of the Wheeling Traction Company, vicepresident of the West Penn Company and vice-president of the West Virginia Power & Transmission Company.

GEORGE GRANT PORTER, at one time connected with the New Jersey & Hudson River Railway & Ferry Company, Edgewater, N. J., is now mechanical engineer of the DeRemer-Blantchford Company, a railway supply concern at Chicago, Ill. Several years ago Mr. Porter was active in railway work. His first experience was with the Pullman Company where he remained for sevenyears. Later he was employed with the West Chicago Street Railway and subsequently went abroad where he worked for the George F. Milnes Company, Ltd., car builders, and later for the London. Underground Railways. On his return to this country he became asso-ciated with the New Jersey & Hudson-River Railway & Ferry Company as master mechanic. This property is now part of the Bergen division of the Public Service Railway of New Jersey. Mr. Porter's experience covers steam and electric railroading, bus projects in London and in the United States and public relations activities.

Obituary

F. G. Simmons

F. G. Simmons, former superintendent of the Denver Tramway, Denver, Col., died on Jan. 20 at Milwaukee, Wis. Mr. Simmons moved from Denver to Milwaukee many years. ago and became prominent in utility enterprises and political movements He served as superintendent of way of the Milwaukee Electric Railway & Light Company and assumed other positions with that property. Early in his career he was an apprentice in the shops of the Denver & Rio Grande Railway and later took a course in civil engineering. He was connected with the Denver City Tramway for nine years in charge of track.

Most of Mr. Simmons' boyhood was spent at Niagara Falls. He was edu-cated at St. Catherines, Ont. He was vice-president of the American Electric Railway Engineering Association for three years and was president of the association for one year. In 1912 he was a member of the committee on standards of the American Electric Railway Association.

W. R. DAUM, president of the railway property in Ottumwa, Iowa, for many years, died on Jan. 25 in his home after a long illness. He was 77 years old. It was during his term of service with the company that the lines in: Ottumwa were electrified.

Manufactures and the Markets

First of Twenty New Cars for New Orleans Arrive

The first of the twenty new cars for the New Orleans Public Service, Inc., were delivered on Jan. 23. Ten of the cars were built by the St. Louis Car Company, and ten by the Perley A. Thomas Car Company. Previous mention of the order was made in the Journal for Aug. 20, Oct. 15, and Jan. 28. Each car has a seating capacity for 52 passengers, and a total weight of 40,000 lb.

The interior trim is in cherry. They are all-steel one-man, two-man, double-truck double-end cars and are equipped with four treadles per car—one in each corner on account of operating conditions in Canal Street in New Orleans. Ten of the units are equipped with four



Interior view of one of the twenty cars for the New Orleans Public Service, Inc.

GE-265-G and ten with Westinghouse 510-E motors.

Complete specifications of these cars were published in the Oct. 15 issue of the JOURNAL.

These cars are merely a small part of the extensive plan of rehabilitation of the property at New Orleans entered upon since the company there passed to the group operated by the Electric Power & Light Corporation.

Twenty-five Articulated Units for Cleveland Railway

Twenty-five articulated units were ordered by the Cleveland Railway on Jan. 13 from the G. C. Kuhlman Car Company, Cleveland, at a contract price of approximately \$450,000. One sample unit manufactured last summer and exhibited at the American Electric Railway Association convention in Cleveland last fall is included in the order.

The total cost of each unit will be approximately \$29,000, according to Joseph H. Alexander, president of the Cleveland Railway. Motors, furnishings and all equipment except seats have been purchased.

Under the contract with the G. C. Kuhlman Car Company, deliveries on the articulated cars are to be made at the rate of five a week, starting 90 working days after the receipt of the order.

Purchase of the articulated cars was made under the authority of the Cleveland City Council. This is the first time that the Cleveland Railway has gone into the market to buy motor cars since 1923.

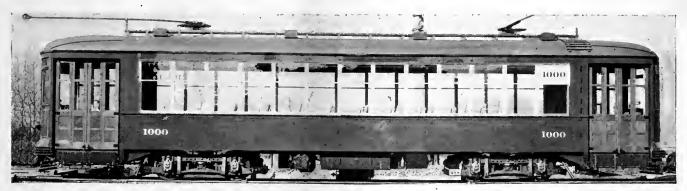
De Luxe Double-Deck Car Suggested by Peter Witt

Peter Witt, Cleveland, expects to exhibit a model of his projected double-deck street car at the American Electric Railway Association convention in Cleveland next September. He has asked twenty railways throughout the country to contribute \$500 each for the construction of one of the cars, and has received favorable replies from six companies, so far. Parlor car seats and smoking privileges on the top deck are planned for the car, since Mr. Witt believes passengers will be glad to pay an extra fare for the luxury and comfort thus afforded.

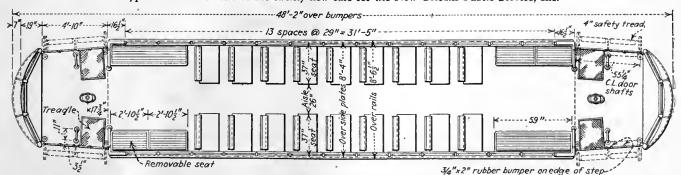
He has not approached the Cleveland Railway with a request to take part in the financing of the first car because any such expenditures would, under the service-at-cost plan in effect there, have to be approved by the City Council. He does, however, hope to have the Cleveland Railway operate the car in experimental service so as to provide data on which to judge its performance. If the model car proves to be a success, Mr. Witt expects to sell it at the convention and return the money advanced by the various railways. Some of the tentative specifications of the car were published in the JOURNAL for Feb. 26, 1927, page 370.

Motor Division Created by G. E.

Announcement of the creation of a motor division of its industrial department has been made by the General Electric Company. The new division will have general supervision of all policies, prices, etc., concerning all motors handled by this department.



Typical exterior of one of the twenty new cars for the New Orleans Public Service, Inc.



Seating plan of the twenty new units for the New Orleans Public Service, Inc., the first of which were delivered on Jan. 23.

Note treadle in each of the four corners

Metal Buying Moderate at Slight Price Concessions

The general tone of the metal market is quiet, with prices slightly easier on Feb. 8 than a week ago. The situation in copper and lead is practically unchanged since early in December; zinc has declined slightly in the two months; and tin is several cents lower, a condition that is beginning to stimulate sales.

Copper sales were very satisfactory on Feb. 1, 2, and 3, with the result that members of the producing group that has been holding for some time at 141 cents delivered in the East and 14.25 cents in the Middle West were able to book several orders at those levels. A large buyer entered the market for prompt shipment, cleaning up much of the spot copper in sight at varying prices between 14.075 cents and 14.125 cents. The lower quotation mentioned has been made by one seller all week, and the market in the last two days has settled down to that level, so far as actual business is concerned, the $14\frac{1}{8}$ cents, Valley, quotation of the large producing interests being largely nominal for the time being. The foreign market has been quiet so far this month, at unchanged quotations of 14½ cents, c.i.f.

Zinc quotations for the last two months have fluctuated within the narrow limits of 5.60@5.70 cents, with little zest in the market. Spot lots of High-Grade are nominally unchanged at 7³/₄ cents for Eastern deliveries.

A comparatively small quantity of lead changed hands during the week ended Feb. 8. Prevailing prices have been 6.50 cents, at which figure the American Smelting & Refining Company has maintained its contract price in New York, and 6.225 cents in St. Louis. Some metal has been available at 6.20 cents in the Middle West, but the tonnage is not large, and, on the other hand, 6.25 cents has been realized on a number of miscellaneous orders.

Tin continues its downward course, and prices are now lower than at any other time in the last three years. Since Jan. 2 Standard tin in London has declined £28 for spot and £24 for futures. Today a contango of £2 prevails, instead of a strong backwardation. Tin of 99 per cent grade is not plentiful, nor is it as scarce as it was a week ago, and the spread between the two grades is upward of ½ cent.

The afternoon of Feb. 8 buying became active and 800 to 1,000 tons was sold, the price for Straits advancing during the day from 52³/₄ to 53¹/₄ cents.

Changes in Personnel of Yellow Truck Company

John Hertz, according to recent advices, resigned as chairman of the board of the Yellow Truck & Coach Manufacturing Company on Jan. 17 to accept the presidency of the Chicago Yellow Cab Company made vacant by the death of Charles W. Gray. He is now both president and chairman of the Cab Company. John A. Ritchie,

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

Metals—New York Feb.	7, 1928
Copper, electrolytic, cents per lb	13,85 16,125 6,50 5,988 53,125
Situmiuous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons Somerset mine run, Bostoo, net tons Pittsburgb mine run, Pittsburgh, net tons. Franklin, Ill., screenings, Chicago, net tons Central, Ill., screenings, Chicago, net tons. Kansas screenings. Kansas Citv. net tons.	1.75 \$1.50 2.125
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft. Weatherproof wire base, N.Y., cents per ib. Cement, Chicago net prices, without bags. Linseed oil (5-bbl. lots), N. Y., cents per ib. White lead in oil (100-lb. keg), N. Y., cents per lb.	5.30 16.50 2.05 10.2 13.25 \$0.645
Turpentine (bbl. lots), N. Y., per gal	30.073

vice-chairman of the Yellow Truck & Coach Manufacturing Company, it is reported, has been elected chairman of the board of that company.

Thomas B. Hogan has been made vice-president and manager of the Cab Company. He was assistant to Mr. Gray. Albert D. Lasker and Alfred Ettlinger have been elected to fill vacancies on the board of directors of the Cab Company.

\$1,036,598 Net Profit for Brill Company

For the year 1927, the combined output of the J. G. Brill Company's four plants amounted in sales value to \$11,876,669. The combined output for each of the past eight years follows:

_		 	
	1920	 	\$17,537,293
	1921	 	7,647,898
	1922	 	10,177,582
	1923	 	18,167,486
	1924	 	8,721,726
	1925	 	9,101,909
			10.416.381
			11,876,669

After deducting from earnings all cost of operations, in which are included maintenance and repairs and depreciation for the year amounting to \$631,-726, and after setting aside out of earnings reserve for federal and state income taxes, not yet due, of \$167,048, the result of the operations of all the plants of the company shows a net profit of \$1,036,598 for the year.

The consolidated profit and loss and earned surplus accounts of the J. G. Brill Company and subsidiary companies for the year 1927 follows:

\$11,876,669
10,673,842
\$1,202,826 166,228
\$1,036,598
\$5,120,015
\$5,120,015 1,036,598
\$6,156,613
561,110

Earned surplus at Dec. 31, 1927..... \$5,595,503

Bids for Buses Advertised. at Detroit

The Department of Street Railways of the city of Detroit is advertising for bids for furnishing buses to be used in the extension of services of the municipal system. Bids are to be opened on Feb. 23, 1928, at the department's main office at St. Jean and Shoemaker avenues.

Proposals are invited for supplying from 15 to 25 buses capable of carrying 29 to 31 passengers each, equipped either with straight mechanical equipment or gas-electric equipment.

From 25 to 50 buses are also specified of 37 to 41 passenger capacity with either straight mechanical or gas-electric equipment. All buses are to be of the street car type,

ROLLING STOCK

NORTHERN OHIO POWER & LIGHT COMPANY, Akron, Ohio, has recently ordered one 40-passenger A.C.F. allsteel metropolitan coach with gas-electric drive,

OKLAHOMA RAILWAY, Oklahoma City, Okla., has purchased seven new 21-passenger buses for service in Oklahoma City.

SHOPS AND BUILDINGS

CHICAGO, NORTH SHORE & MILWAU-KEE RAILROAD, Chicago, Ill., has opened a new ticket office and depot at National and First Avenues in Milwaukee. The office has been completely remodeled.

TRADE NOTES

Ohmer Fare Register Company, Dayton, Ohio, advises that it has completed final shipment of 559 No. 22 type Ohmer registers to the International Railway, Buffalo, N. Y., ordered for the accounting of revenue on city lines. The register company advises that with these machines going into service, the entire property, including the interurban and city cars, will be approximately 100 per cent Ohmer equipped.

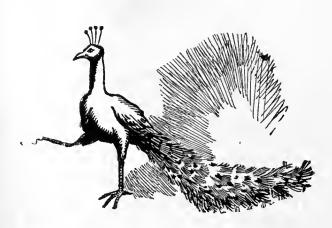
ADVERTISING LITERATURE

CHAUSSE OIL BURNER COMPANY, Elkhart, Ind., has issued an illustrated circular descriptive of its oil-burning tar kettles and torches.

Pyrometer Instrument Company, New York City, has issued a pamphlet "The Great Step Forward," emphasizing the advantages of its new simplified pyro optical pyrometer.

Crouse-Hinds Company, Syracuse, N. Y., is mailing Bulletin 2107, describing its pipe hangers, fixture hangers, unions and connectors.

Do you know that—



"Peacock" Staffless Brakes—

Reg. U. S. Pat. Off.

Occupy very little platform space?

Have three times the braking capacity of ordinary hand-brakes?

Have 144 inches of chain winding capacity?

Are the simplest to operate?

Are light in weight?

Are low in installation and maintenance costs?

Are standard equipment on nearly all modern cars?

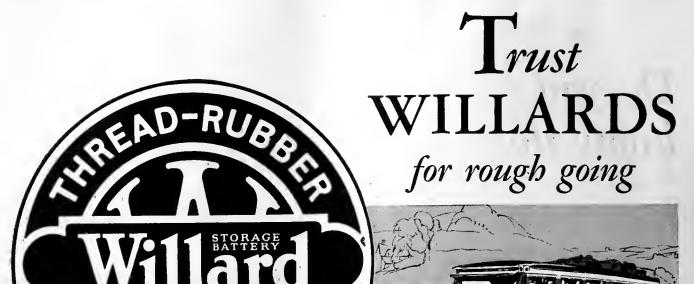


They Are.

National Brake Company, Inc.
890 Ellicott Square
Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Canada





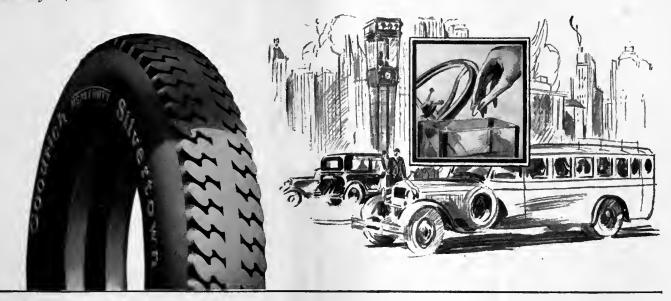
Extra strength in every part—accurate work-manship—and design that takes account of the hard knocks of the service fit this Willard for its job.

Willards are built on the principle that it takes extra quality to stand extra punishment. And that's what a battery gets in bus service.

Because of their extra heavy plates, their long-lived Willard Threaded-Rubber Insulation and other features, Willards have built a reputation for bringing every bus in on time—every trip—and for giving extra months of service even when handicapped by rough roads and night driving.

Depend on Willards to do a better job—always—on the busses you build or operate.

Willard
Batteries



The Dimes and the Dollars don't all come from Fares!



A THOUSANDTH of an inch in an engine bearing often makes a mighty difference—and in Goodrich Heavy Duty Silvertowns a slight increase in the spacing of cords in two outer plies is one of the factors in adding to their remarkable performance.

The big fact is—every element of mileage is carefully worked out—perfected—used in making

Goodrich Heavy Duty Silvertowns give exceptional mileage on buses. They are cured from inside and outside both—to make them tough clear through. An extra cushion of gum beneath the tread guards against damage from road shocks. Tough tread rubber is used from bead to bead. The cords are accurately matched for stretch—to protect a few from overwork.

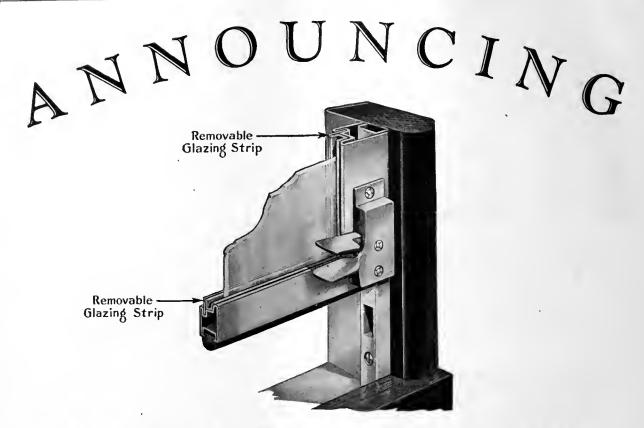
All this means savings—"dimes and dollars" worth of extra mileage—for the buses on Goodrich Heavy Duty Silvertowns. And many of the best known fleets are using them.

THE B. F. GOODRICH RUBBER COMPANY, Est. 1870 Akron, Ohio In Canada: Canadian Goodrich Company, Kitchener, Ont.

Goodrich HEAVY DUTY Silvertowns

HIGH PRESSURE OR BALLOON

WINDOWS DO MAKE A DIFFERENCE



Edwards Metal Sash with Removable Glazing Strips

AGAIN Edwards pioneers in window design and construction. Forty-one years of experience with window accessories are behind the perfection of Edwards Metal Sash with Removable Glazing Strips...for electric cars and motor coaches.

The Removable Glazing Strips cut over three-quarters of the time necessary for replacing window glass.

Sash need never be taken from opening. The glazing strips require only a few seconds to remove. Replace the glass, slip the glazing strips into place...and the car or bus is ready for service.

No time lost because of broken windows...no costly delays.

The construction is simple...yet this advance in metal sash design will save electric railway companies many thousands of dollars in time and labor. Detailed information sent on request.

O. M. EDWARDS CO.

New York Syracuse, N. Y. Chicago

Canadian Representatives:

Canadian Representatives: Lyman Tube & Supply Co., Ltd., Montreal and Toronto



Edwards Metal Sash



~ it belongs in every transportation system

belongs - because of size,



Graham Brothers Motor Coaches are complete coaches—bodies and chassis built by one manufacturer. They represent no compromise between body builders' ideas and chassis makers' ideas. They are in no sense a makeshift. Body and chassis are designed and built to carry passengers comfortably and safely and to assure the operator a low operating cost and dependable service throughout a long life . . . Great volume production makes the prices unusually low—\$4060 for the complete 21-passenger street car type, \$4045 for the complete 12-passenger parlor coach and \$4290 for the complete 16-passenger coach (all prices f.o.b. Detroit) . . . Dodge Brothers dealers sell and service the complete coach.

GRAHAM MOTOR

SOLD BY DODGE BROTHERS

performance, economy!

Graham Brothers 21-passenger Street Car Type Motor Coach meets a universal transportation need - -

Success of operation, so universal among owners of Graham Brothers Motor Coaches, is attributed by the operators themselves to two primary facts—

The 21-passenger street car type coach is adaptable to the greatest number of traffic conditions—is capable of giving the sort of service the public wants, economically and with the greatest frequency, and—

Graham Brothers Coaches, physically and mechanically, are "everything a modern motor coach should be or have"—to use one operator's phrase.

Power, speed, safety, quiet, comfort, fine appearance,—these, like dependability, have always been qualities for which Graham Brothers Motor Coaches have been noted. And the operators whose money is invested in them know Grahams equally well for their low operating costs and their unusual freedom from layups for repairs.

BROTHERS COACHES

DEALERS EVERYWHERE

- - Serviced

by DODGE BROTHERS Dealers

EVERYWHERE

Graham Brothers Motor Coaches are operating successfully everywhere—on metropolitan streets and on remote rural highways. But they are never far from a Dodge Brothers Dealer, equipped, to furnish quick, intelligent service and any repair parts needed—at low cost.

GRAHAM BROTHERS

EVANSVILLE - DETROIT - STOCKTON

A DIVISION OF DODGE BROTHERS, INC
GRAHAM BROTHERS (CANADA) LIMITED. TORONTO. ONTARIO

Kelly-Springfield Bus Balloons

besides giving greater mileage per dollar spent, give greater comfort and safety to your passengers.



KELLY BUS BALLOONS





Comfortable Travel!

Bus design, luxurious equipment, and tires, too, all play an essential part in first-class travel by motor coach.

Pneumatic tire construction that provides the very utmost in bus activity and cushioning has been developed by Goodyear. To cite one item of this construction — SUPERTWIST — it is evident that this extra-elastic, extra-durable cord promotes a riding quality in Goodyear Tires that is not to be found in others.

Typical of their performance in bus operation the country over is the record of Goodyear Pneumatic Cord Tires in the service of The Shore Line Motor Coach Company, of Michigan City, Indiana.

The Shore Line operates 172 motor coaches between Chicago and Detroit, and other Illinois, Indiana and Michigan centers.

The interurban runs are of considerable length, and there is much city running, a good deal of it in Chicago, South Chicago, Indiana Harbor, Whiting, Hammond, and other city streets where pavements are extremely rough and traffic is a continual stop-and-go proposition.

Eighty-five per cent of the Shore Line coaches are equipped with Goodyear Tires. In an average month, they carry more than 620,000 passengers and travel over 500,000 miles.

In this service, individual Goodyear Tires have stood up for such distances as 21,000, 23,000, 24,000, 29,000 and even 30,000 miles!

"We have had excellent results with Goodyear Tires," writes Mr. J. C. Johnson, General Manager, "and are perfectly satisfied with their riding quality, long wear and general utility."

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service







Not alone in De Luxe Parlor Coach Bodies does Lang incorporate luxury.

The short-haul city rider is entitled to comfort—and gets it in this Lang All-Metal Body, luxurious even for city service. More rides more often is the result.

Clear vision front, narrow steel frames, easily replaced panels, single raise sash, pleasing interior and exterior lines; all these and many other features testify to the knowledge of Lang craftsmen who are always in touch with the inherent needs of steel body construction as applied to railway and motor bus service.

Whether built on a new or an old chassis, Lang Bodies create passengers. They are the very last word in modern body design and construction.



his old chassis needed a new setting

Mechanically it was sound, but the original body had lost its attractiveness to passengers.

Lang craftsmen, skilled in restoring revenue-earning power to such jobs, placed the chassis on the road equipped with a New Body, fine in line, luxurious in appointments, sturdy and practical in every detail. The operator protected his investment, the public picks the bus, and is rapidly paying the cost of the new body.

After all, it's the setting that counts!



LANG HAS A......

SPECIAL DEPARTMENT FOR
BODY REPLACEMENT
AND MAINTENANCE

THE LANG BODY COMPANY, CLEVELAND, OHIO



A corner of the Bethlehem Frog and Switch Assembly Shops at the Steelton Plant, Steelton, Pa.

TRACK LAYOUTS that ASSEMBLE EASILY

AT THE BETHLEHEM FROG and SWITCH PLANT every special track layout is completely assembled in well lighted and heated shops before shipment. The fact that the work is done under cover, with the men protected from the elements, has the advantage of assuring the maximum of care and accuracy in the fitting of the parts. This, in turn, means complete freedom from annoying delays in the field due to an incorrect trial assembly.

Orders for any kind of standard or special trackwork will be accorded prompt attention and filled expeditiously.

Partial List of Bethlehem Railway Equipment

Special Trackwork Special Splice Bars for welding Girder Rails Tee Rails

Machine Fitted Joints Pole Line Material Abbot and Center Rib Base Plates Tie Plates

Rolled Steel Wheels Hard Center Frogs Forged Axles Tie Rods

BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.

New York Cleveland Detroit

Philadelphia Cincinnati

Chicago

Baltimore St. Louis

DISTRICT OFFICES: Washington San Francisco Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporters of Our Commercial Products.

Atlanta Los Angeles Pittsburgh Seattle

Buffalo Portland

BETHLEHEM

Service Always Available

252 Offices Ready to Serve National Fare Register Users



The new National Fare Register

THOROUGH tests in actual operation have shown that the National Fare Register requires a minimum of service. Ability to withstand vibration and to function under the most difficult conditions are among the important advantages of this new machine.

But every interurban railway operator knows the necessity of having service quickly available when it is needed.

The 252 National Cash Register offices in the United States and Canada provide a service which covers all sections. In addition to these main offices there are a number of sub offices. Skilled mechanics, factory trained, are your assurance of quick, satisfactory and economical service. Knowledge that such service is always available is just one reason why progressive operators of interurban railways are choosing the new National Fare Register to protect their receipts and serve passengers quickly.

This machine permits faster operating schedules, gives instant printed totals of fares collected, prevents passengers exceeding distance paid for unless additional fare is collected, and reduces the cost of tickets. The machine is small and compact and is built to withstand rough usage.

Complete information about this new machine can be secured by writing to the factory at Dayton or from our nearest representative.

NATIONAL FARE REGISTERS

The National Cash Register Company Dayton, Ohio





Chicago's Famous "Loop" Service Depends on Phono-Electric

You know the concentrated day and night activity of Chicago's famous "Loop" district. On the main arteries of the Chicago Surface Lines, the car passes approach 2400 per day emerging from the "Loop." An official writes as follows:

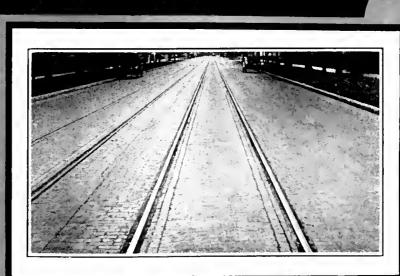
"For a number of years we have used Phono-Electric trolley wire in our Loop' district. This main shopping center is all located within a radius of a half-mile, where we probably have the most severe operating conditions on our entire system. We have special trolley work at practically all street intersections, which, of course, must be maintained 100% at all times. We find that with the use of Phono-Electric we can maintain our lines in better shape and at less cost."

The Bridgeport Brass Company's Phono Book contains information showing why Phono-Electric trolley wire makes economies demanded in modern overhead maintenance. Send your name and address for a copy.





MILD YOU AND BUILD RIDE



DAYTON MECHANICAL TIE CO.



You only need a glance at the pictures on the preceding page to arrive at an answer. You know that a ride over the rough track would not be a pleasure excursion.

And the answer has a lot to do with the profitable operation of your property. If your track is rough like the upper picture, patronage is bound to suffer. It will suffer no matter how much you spend on beautiful rolling stock.

But smooth, easy riding track attracts patronage, enables you to obtain full benefit of modern rolling stock.

Dayton Ties give you smooth track—not for a year or two—but for a very long period. The sixteen years since the inception of Dayton Ties has not been long enough to wear out any track laid on them. We don't know how long they will last.

The necessary shock absorption feature in the tie preserves the concrete foundation indefinitely—as long as the concrete lasts, the track will stay smooth.

Dayton Track is always smooth

THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO

THERE IS A TEXACO LUBRICANT FOR EVERY PURPOSE





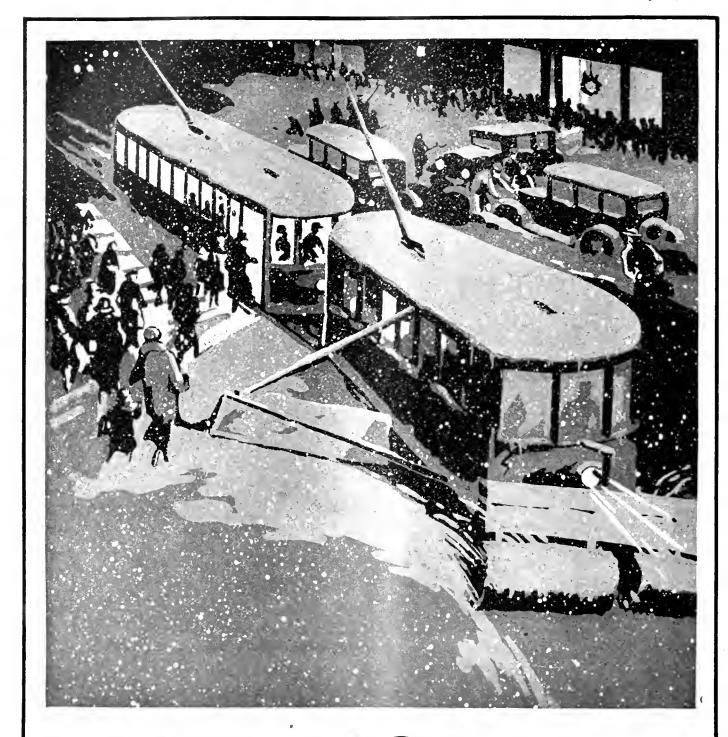
The foresight and sound scientific background that developed the *New* and *Better* TEXACO Gasoline (and made it the standard by which other automotive fuels are judged) control the quality and suitability for the purpose, of every TEXACO Industrial Lubricant.

THE TEXAS COMPANY

Texaco Petroleum Products

Dept. E2, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES



SERVICE.. yesterday-today-tomorrow Barron G. Collier Inc.

Candler Bldg.

New York



Twenty Years from Now

you will appreciate more fully the economy and satisfaction of track that is laid today on Carnegie Steel Cross Ties.

Carnegie Ties provide a safe, smooth, repair-free track. They reduce maintenance cost by eliminating track renewals.

The exact life of Carnegie Ties is difficult to estimate, as it depends of course on varying conditions. A number of cases, however, have been called to our attention where ties have been uncovered for rail renewal after thirteen, sixteen and eighteen years of service, and the ties have been found in excellent condition and available for further use.

Car riders appreciate the smooth-riding track laid on Carnegie Steel Ties. A satisfactory track invites patronage.

A copy of our catalogue—"Steel Cross Ties" is yours on request.

CARNEGIE STEEL COMPANY

General Offices • Carnegie Building • 434 Fifth Avenue pittsburgh pennsylvania

Low initial cost and maintenance With the New W-N Drive

Now Nuttall has made it possible for you to use modern high-speed, high-efficiency, low cost motors for traction service. Light and compact, the new W-N Drive gives the necessarily high speed reduction through heat treated and hardened helical

gears, mounted on Timken Roller Bearings and totally enclosed in an oil-tight steel case.

The resulting installation is inexpensive, exceptionally efficient, and requires much less maintenance than the more conventional equipment.

R.D.NUTTALL COMPANY PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.





Griffin Wheel Company

410 North Michigan Ave. Chicago, Ill.

Griffin Wheels

with
Chilled Rims
and
Chilled Back of Flanges

For Street and Interurban Railways

FOUNDRIES:

Chicago Detroit Denver Cleveland

Boston Kansas City Couneil Bluffs

Salt Lake City

St. Paul Los Angeles Tacoma Cincinnati



COLUMBIA

Railway Supplies and Equipment

Machine and Sheet Metal Work

Forgings
Special Machinery
and Patterns

Grey Iron and Brass Castings

Armature and Field Coils.

The Columbia Machine Works and M. I. Co.

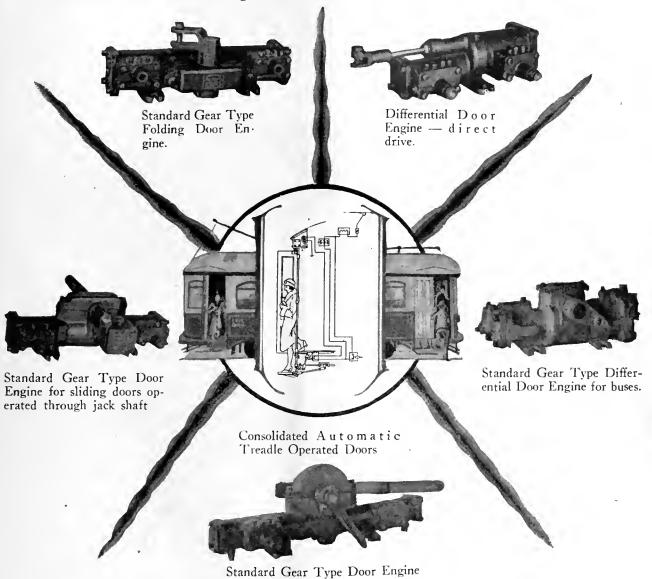
265 Chestnut St., corner Atlantic Ave., Brooklyn, New York

CONSOLIDATED DOOR OPERATORS

Door operating equipment for every type of car and bus

Pneumatic and Electro-Pneumatic Control and automatic treadle operated doors

Special Safety Features



Maximum
Service—
Minimum
Attention

for large sliding doors.

Standard Gear Type Door Engine for small or medium sized sliding doors.

Maximum
Safety—
Minimum
Parts

Over 20 years' experience in door operating engineering is at your service

CONSOLIDATED CAR-HEATING CO.

NEW YORK

ALBANY, N. Y.

CHICAGO

Bankers an Engineers

Ford, Bacon & Pavis

Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White **Engineering Corporation**

Engineers-Constructors

Oil Refinerles and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Design and Construction Examinations Reports Appraisals Industrial and Public Service Properties

BOSTON

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys Better Service—Financial Reports Appraisals—Management

52 Vanderbiit Ave.

New York

SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design

Examinations

Construction

Management Valuations

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineers

alsals Reports Rates Service Investigation Studies on Financial and Physical Rehabilitation Reorganization Operation Management

683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

J. ROWLAND BIBBINS

Engineer-2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies EXPERIENCE IN 20 CITIES

C. B. BUCHANAN President

W. B. PRICE, JR. Sec'y-Tress.

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction
Financial Reports, Traffic Surveys
and Equipment Maintenance
BALTIMORE
Phone:

1004 Citizens National Bank Bidg.

Phone: Hanover: 2142

NEW YORK 49 Wail Street

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING ion Management Operation Construction Reorganization 43 Cedar Street, New York City

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS 120 BROADWAY, NEW YORK

YOUNGSTOWN, O. CHICAGO, ILL.

FINANCING MANAGEMENT

KELKER, DELEUW & CO.

CONSULTING ENGINEERS REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W. Washington Street, Chicago, Ill.

MCCLELLAN & JUNKERSFELD

Incorporated ENGINEERING AND CONSTRUCTION Examinations—Reports—Valuations
Transportation Problems—Power Developments

68 Trinity Place, New York Chicago

St Louis

E. H. FAILE & CO.

Designers of

Garages— Service Buildings—Terminals

441 LEXINGTON AVE.

NEW YORK

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass-Differential Fares-Ride Selling Holbrook Hall 5-W-3 160 Gramatan Ave., Mt. Vernon, N. Y.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES

ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CLEVELAND, Guardian Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street



WORKS Bayonne, N. J. Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBUROH, FARMERS Deposit Bank Building
PORTLAND, ORE., Failing Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, ROYAL BANK BUILDING

rian en en en la participa de la company
THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK

Street Railway Inspection DETECTIVES

TRAFFIC CONSULTANT

Freight Rate, Tariff and Traffic Analyses;
Advisory Freight Traffic Assistance
on Special or Mouthly Basis;
Preparation of Cases hefore Interstate Commerce
Commission and State Commissions.

HALSEY McGOVERN

Mills Bldg., 17th and Pa. Ave., Washington, D. C.

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



H B LIFE GUARDS

A CONTRACTOR DE LE CONTRACTOR DE LE CONTRACTOR DE LA
PROVIDENCE FENDERS

Manufactured by

CONSOLIDATED CAR FENDER Co., PROVIDENCE, R. 1.

General Sales Agents WENDELL & MacDUFFIE CO., 110 E. 42nd St., N. Y. C.



CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

WITH OPEN COIL OR ENCLOSED ELEMENTS ELECTRIC HEATERS THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE



CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetless—Light Weight Best for Service — Durability and Economy, Write Us.

Chillingworth Mfg. Co. Jersey Clty, N. J

CEDAR POLES

WESTERN

ii Suumunuuunun maanaan m

ennencomenicalitation (companicalitation)

TIES

BELL LUMBER CO., Minneapolis, Minn



TABLET TABLET TABLET TO THE TABLET TO THE TABLET TA

STUCKI SIDE BEARINGS

A. STUCKI CO. Oilver Bidg. Pittsburgh, Pa

Efficient Bus Heating

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.

7960 Lorain Ave.

Cleveland, Ohio



CREOSOTED

Railroad Cross-ties; Switch-ties; Bridge Timbers; Construction Timbers; Mine Timbers, Lumber; Piling; Poles; Posts and other Forest Products

Prettyman & So od Prezerving Plant Charleston. S. C. 5ons





For Passenger Comfort and Operating Economy insulate Cars with

Balsam-Wool



PUBLIC patronage is rapidly captured by comfortable cars. The car insulated with Balsam-Wool is easier to heat in winter, quieter and more comfortable, cool in summer—all of which are features which riders appreciate.

Balsam-Wool contains millions of dead air cells—is 95% "still" air. That is why it has such high insulating value and weighs so little.

Its light weight provides a lighter car which reduces operating cost—saves many ton miles of dead haul.

Balsam-Wool is durable, elastic, tough, flexible, and non-settling. Chemical treatments render it resistant to fire and decay.

We shall be glad to supply samples and complete information to interested railway executives.

WOOD CONVERSION COMPANY

Insulation Division of Weyerhaeuser Forest Products

Mills at Cloquet, Minnesota

Industrial Sales Office: 360 N. Michigan Ave., Chicago, Ill.



Competition is keen —meet it with cars

—meet it with cars that invite patronage!

MAKING the public aware of the advantages of your service by clean, attractive-looking-cars, pays. It is one of the most effective ways to meet today's keen competition.

Keep your equipment looking its best at all times by using Oakite materials on every cleaning job, inside and out. There is no better way to wash dirty, grease-covered trucks; no easier way to brighten up paint or to clean upholstery, windows and interior trimmings. Cakite materials are equally effective in removing any kind of dirt. They are thorough!

Shall we send you interesting booklet and further details?

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U.S. and Canada

Cakite is manufactured only by

OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

OAKITE

Industrial Cleaning Materials and Methods



EARCHLIGHT SECTION

USED EQUIPMENT @ NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED-RATE PER WORD:

Positions Wented, 4 cents a word, minimum 15 cents an insertion, payable in advance.

Positions Vaccent and all other classifications, 8 cents a word, minimum charge \$2.60. Proposals, 40 cents a line an insertion.

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads. Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED-RATE PER INCH: DISPLAYED—RAYE FER INCH:

1 to 3 inches. \$1.50 an inch
4 to 7 inches. 4.30 an inch
8 to 14 inches. 4.30 an inch
Rates for larger spaces, or yearly rates, or request,
An advertising inch is measured vertically on
one column, 3 columns—30 inches—to a page.

POSITIONS VACANT

LARGE Eastern property has opening for young experienced schedule maker. In first letter give full details, references, experience, and salary expected. P-86, Electric Rallway Journal, 1600 Arch St., Philadelphia, Pa.

VACANT POSITIONS? Other experienced electric railway men besides yonrself will read the above ad. If you have a similar vacancy to fill or require other experienced electric railway men, an advertisement here will bring you high grade inquiries from which you can select the right man for the job.

"SEARCHLIGHT"

Opportunity Advertising

- —to help you get what you want.
- -to help you sell what you no longer need.

Take Advantage Of It For Every Business Want "Think SEARCHLIGHT First"

G-36

POSITIONS WANTED

DISTRIBUTION engineer in charge of all ISTRIBUTION engineer in enarge of au outside electrical equipment, poles and fixtures, track bonding, overhead and underground cables and trolley lines, signals and switches; experienced and successful; single; will consider any part of country or foreign countries; excellent references. PW-85, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

GENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MASTER MECHANIC of character and ability, 20 years' practical experience on city and interurban property, desires to make a change for personal reasons. Best of references; correspondence so-licited. PW-83, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

MR. EXECUTIVE—Do you need a progressive equipment man? Assistant superintendent of rolling stock connected with large operating company wishes position carrying full responsibility for equipment; technically trained, age 35, with 10 years' practical experience. PW-80, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SHOP FOREMAN, A-1 on city and interurhan equipment, 2I years' successful experience, can handle men and get results. Correspondence solicited. PW-84, Electric Rallway Journal, 7 So. Dearborn St., Chicago, Ill.

SUPERINTENDENT transportation; available in near future; qualified by wide experience; a proven successful record, city and interurban railways and coordination rail and bus service; recognized ability in dealing successfully with labor and public and all transportation problems; qualified by experience and ability to successfully fill position of superintendent or assistant manager; correspondence invited; high grade references. PW-82, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

WOULD like to correspond with any company needing a high-grade official in any capacity, in city or interurban railways; can manage any or all departments in the cost efficient manner. PW-33, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

BARGAINS IN CARS!

See our advertisement in the January 28th and February 4th issues for offerings of modern cars at ubusually low prices—or write us for particulars!

G. T. ABEL
Used Railway Equipment
93 7th Ave., New York City
Telephone Longacre 7372

A COMPLETE POWER HOUSE EQUIPMENT

- -250 hp. B. & W., and 4-354 hp. Sterling Boilers with Murphy furnaces

- —250 hp. B. & W., and 4—354 hp. Sterling Boilers with Murphy furnaces and stokers.

 —750 hp. Hoppe Live Steam Purifiers.

 —2,000 hp. Cochran Open Heater.

 —1,500 hp. 28x52 Allis-Chalmers Tandem Compound Condensing Engines.

 —2,500 hp. 32x68 Allis-Chalmers Tandem Compound Condensing Engines.

 —1,000 kw., 575 v. General Elec. D.C. Railway Generators.

 —1,000 kw., 675 v. Westinghouse D.C. Railway Generators.

 —1,500 kw., 625 v. Westinghouse D.C. Railway Generator.

 —1,500 kw., 625 v. Westinghouse D.C. Railway Generators.

 —1,500 kw., 625 v. Westinghouse D.C. Railway Generators.

 —1,500 kw., 625 v. Westinghouse D.C. Railway Generators.

 —2,500 kw., 625 v. Westinghouse D.C. Railway Generators.

 —1,500 kw., 625 v. West

- -Worthington Compound Boller Feed Pump, 12x17x9½x15.
 -Worthington Compound Fire Steam Pump, 10x5x10.
 -Davidson Simplex Pump, 6x3½x6.
 -350 kw. Westinghouse 350 v. D.C. Generator, series wound, 420 r.p.m. direct connected to 1—520 hp. West. 550 v. D.C. shunt wound Motor.
 -Brown Hoisting Co. Crane, 60 ft. span, 25 ton, hand operated.
 -Link Chain Bucket Conveyor, motor driven type.

Also all miscellaneous, as piping, all pumps, filters, compressor, steel stack and breeching, coal and ash bunkers. All equipment on foundations and in operating condition. Will sell as a whole or in part.

CITY OF DETROIT Department of Street Railways G. W. WAGNER, Supervisor of Purchases.

FOR SALE

15 BIRNEY SAFETY CARS

Brill Built

West, 508 or G. E. 264 Motors Cars Complete—Low Price—Fine Condition ELECTRIC EQUIPMENT CO.

Commonwealth Bldg., Philadelphia, Pa.

Send for Special Bulletin on light weight, all steel, single and double

Or, for complete description-with prices-see our full page ad. in Jan, 14 issue Electric Railway Journal, half page Jan. 21 issue or quarter page Feb. 4 issue.

The Irving S. Van Loan Corp. 1819 Broadway, New York City Telephone: Columbus 4278

We buy entire Railways and Power Plants New York City

We sell Street Railway and Power equipment

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue This index is published as a convenience to the reader. Every care is taken to make it accurate, but Electric Railway Journal assumes no responsibility for errors or omissions.

Advertising, Street Car Collier, Inc., Barron G. Air Brakes
General Electric Co.
Westinghouse Traction
Brake Co.

Anchors, Gny
Else. Service Supplies Co.
General Electric Co. Chio Brass Co. Weetinghouse E. & M Co.

Armacuce Shop Tools
Columbia Machine Works
Elec. Service Supplies Co. Automatic Return Switch Ramapo Ajax Corp.

Automatic Safety Switch Stands Ramape Ajax Corp.

Axles

Bemis Car Truck Co.

Bethlehem Steel Co.

Brill Co., The J. G.

Carnegie Steel Co. Cincinnati Car Co. Standard Steel Works Westinghouse E. & M. Co. Babbitting Devices Columbia Machine Works

Babbit Metai National Bearing Metals Corp.

Badges and Buttons
Elec. Service Supplies Co.
Batteries, Dry
Nichols-Lintern Co.

Batteries, Storage Willard Storage Battery Co

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
National Bearing Metal
Corp.

Corp. Westinghouse E. & M. Co. Bearings, Center and Roller Side
Cincinnati Car Co.
Columbia Machine Works
Stucki Co.. A.
Bearings, Roller
Timken Roller Bearing Co.

Bells and Buzzers Consolidated Car Heating Co.

Bells and Gonge Brill Co., The J. G. Cincinnati Car Co. Columbia Machine Works Columbia Machine Works Elsc, Service Supplies Co.

Benders, Rail Railway Trackwork Co. Body Muterial, Haskelite Plymeti Haskelits Mig. Corp.

Bodies, Bus
Brill Co., The J. G.
Graham Bros.
Lang Body Co.

Boliers
Babcock & Wilcox Co.

Bond Testers American Steel & Wire Co. Electric Service Supplies

Bonding Apparatus
American Steel & Wire Co.
Elec. Service Supplies Co.
Gbio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail American Steel & Wire Co. American Steel & Wire Co. Elec. Service Supplies Co. General Electric Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Bracketa and Cross Arma
(See also Poles, Ties,
Posts, etc.)
Bates Expanded Steel
Truss Co.
Columbia Machine Works
Elec, Ry. Equipment Co.
Elec, Service Sunnies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry, Appliance Co.
Westinghouse Tr. Br. Co.

Westing House 17. Dr. Co.
Brake Shoes
American Brake Shoe &
Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Brake Testers
National Ry. Appliance Co.

National Ry. Appliance Co.
Brakes, Brake Systems and
Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.
Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon General Electric Co Westinghouse E. & M. Co. Brushholders Columbia Machine Works General Electric Co.

Bulkhends Haskelite Mfg. Corp. Bunkers, Coal American Bridge Co.

Busca General Electric Co. Graham Bros.
International Motor Co.
Mack Trucks, Inc.
Yellow Truck & Coach Co.

Bus Lighting
National Ry. Appliance Co Rushings, Case Hardened and Mangauese Bemis Car Truck Co. Brill Co., The J. G. Cincinnati Car Co. Columbia Machine Works

Cahles (See Wires and Cahles)

Cambric Tapes, Yellow and Biack Varnish General Electric Co. Irvington Varnish & Ins.

Carbon Brushes (See Brushes, Carbon) Car Lighting Fixtures
Elec. Service Supplies Co. Car Panel Safety Switches Consolidated Car Heating Co. Westinghouse E. & M. Co.

Car Steps, Safety Cincinnati Car Co. Car Wheels, Rolled Steel Bothlehem Steel Co.

Cars. Dump Brill Co.. The J. G. Differential Steel Car Cp. Cars. Gas-Electric Brill Co.. The J. G. General Electric Co. Westinghouse E. & M. Co.

Cars. Gas. Rall Brill Co., The J. G.

Cars. Passenger, Freight,
Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.

Electric Equipment Co.

Cars., Self-Propelled

Brill Co., The J. G.

Castings, Brass Composition
or Copper
Anderson Mfg. Co., A. &
J. M.
Cinetroet C. J. M. Cinetunati Car Co. Columbia Machine Works National Bearing Metals

Castings, Gray Iron and Steel American Brake Shoe & Foundry Co.
American Steel Foundries
American Bridge Co.
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works Castings, Malicable & Brase American Brake Shoe & Foundry Co. Bemis Car Truck Co. Columbia Machine Works

Catchers and Retrievers,
Troiley
Elec. Service Supplies Co.
Ghio Brass Co.
Wood Co., Chas N. Catenary Construction Archbold-Brady Co.

Ceiling Car Haskelite Mfg. Corp. Cellings Plywned Panels Haskelite Mfg. Corp.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Change Trays Cincinnati Car Co. Circuit-Breakers Andersen Mig. Co., A. & J. M.

J. M. General Electric Co. Westinghouse E. & M. Co.

Westinghouse E. & M. Co.
Clamps and Connectors for
Wires and Cables
Columbia Machine Works
Else. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners Cakite Products, Inc.

Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms) Brill Co., The J. G. Cincinnati Car Co. Long Mfg. Co.

Coll Banding and Winding Machines Columbia Machine Works Elec. Service Supplies Co. Westinghouse E. & M. Co. Colla. Armsture and Field Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Coils, Choke and Kicking Elec. Service Supplies Co. General Electric Co. Westinghouse E & M. Cp. Coin Changers

Johnson Fare Box Co. Coln Counting Machines Cleveland Fare Box Co. Johnson Fare Box Co. Coin Sorting Machines Claveland Fare Box Co. Johnson Fare Box Co.

Coin Wrappers Cleveland Fare Box Co. Cieveland Fare Box Co.
Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
Wood Co.. Chas. N.
Commutators or Farts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.
Compressors Air

Compressors. Air General Electric Co

Westinghouse Tr. Br. Co. Condensers
General Electric Co.
Westinghouse E. & M. Co.

Condensor Papers Irvington Varnish & Ins.

Connectors. Selderless Westinghouse E. & M. Co.

Connectors, Trailer Car Columbia Machine Works Consolidated Car Heating Co. Elec. Service Supplies Co. Ohio Brass Co.

Controllers or Parts Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Controller Regulators Elec. Service Supplies Co. Controlling Systems
General Electric Co
Westinghouse E. & M. Co. Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co. Copper Wire
American Brass Co
American Steel & Wire Co.
Anaconda Copper Mining
Co.

Copper Wire Instruments, Measuring, Testing and Recording American Brass Co, Anaconds Copper Mining Co.

Cord, Bell, Trolley, Register American Steel & Wire Co. Brill Co., The J. G. Elec. Service Supplies Co. Rosbling's Sone Co., John A Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers. Car
American Steel Foundries
Brill Co., The J. G.,
Cincinnati Car Co.,
Ohio Brass Co.,
Westinghouse Traction
Brake Co.

Cowl Ventilators Nichols-Lintern Co. Cranes, Hoists & Lifts Electric Service Supplies Co Cross Arms (See Brackets) Crossing Foundations International Steel Tie Co.

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co. Crossings, Frogs & Switches Remapo Ajax Corp. Wm. Wharton, Jr. & Co.

Will. Wharton, Jr. & Co.
Crossings, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.
Crossings, Track (See Track
Special Work)

Crossings, Trolley General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co. Curtains & Curtain Fixtures
Brill Co., The J. G.
Edwards Co., O. M.

Cutting Apparatus
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Electrical &
Mig. Co.

Hand Equipment
G. T. Abel
Electric Equipment Co.
Irving S. Van Loan Corp.
Salzberg Co., Inc., H. E.

Derailing Devices (See also Track Work) Derailing Switches Ramapo Ajax Corp.

Destination Signs Columbia Machine Works

Elec. Service Supplies Co. Detective Service Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.,
Consolidated Car Heating Co.
National Pneumatic Co.
Safety Car Devices Co.

Doors & Door Fixtures
Brill Co. The J G.
Cinciunati Car Co.
Edwards Co., C. M.
Hale-Kilburn Co.

Doers. Folding Vestibute National Preumatic Co Safety Car Devices Co.

Drills, Track
American Steal & Wire Co
Electric Service Supplies Co
Chio Brass Co.

Dryers, Sand
Electric Service Supplies Co

Eare
Columbia Machine Works
Electric Service Supplies to
General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co. Electric Grinders

Railway Trackwork Co. Eiectrical Wirea and Cablea Amer. Electrical Works. American Steel & Wire Co John A. Roebling's Sone Co

Electrodes, Carbon Railway Trackwork Co. Una Welding & Bonding Co.

Electrodes, Steel Railway Trackwork Co. Una Welding & Bonding Co

Lauway ITRERWOFE CO.
UDA Welding & Bonding Co
Engineers, Consulting, Coetracting and Operating
Beeler, John A.
Bibbine, J. Rowland
Day & Zimmermann, Ine
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
McGovern, Halsey
Richey, Albert S,
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp., The J, &
Englnes, Gasoline

Engines, Gasoline Waukesha Motor Co. Engines, Gas, Oil or Steam Westinghouse E. & M. Co.

Exterior Side Panela Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Cash Register Co. Perey Mig. Co.

Fare Registers
Electric Service Supplies Co.
Johnson Fare Box Co.
National Cash Register Co. Fences, Wovee Wire & Fence Posts

American Steel & Wire Co. Fenders and Wheel Guards
Brill Co.. The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co
Star Brass Works
Wood Co.. Chas. N.
Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Colle (Sep Colle) Floodilghte Electric Service Supplies Co General Electric Co.

Floor, Sub Haskelite Mfg. Corp.

Floors Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Standard Steel Works
Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co
General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co.

Fuses and Fuse Boxes
Columbia Machine Works
Consolidated Car Hesting Co. General Electric Co. Westinghouse E. & M. Co.

Gas Electric Drive for Buses General Electric Co. Gaskria
Westinghouse Tr. Br. Co.
Gasoline
Texas Co., The
Gas Producera
Westinghouse E. & M. Co

Gates, Car Brill Co., The J. G. Cincinnati Car Co (Continued on page 50)



JOHNSON **FARE** COLLECTING SYSTEMS

.



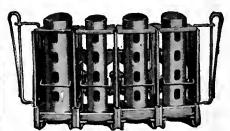
renencember and tentember 2

Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 14 to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.





Johnson Fare Box Co.

4619 Revenswood Ave., Chicago, Ill.

05T7087C0001(C3)(C001(C001(00)(C03)C003(C03)C001((C5))C003(00)(C010(C2)((G3)(C3)(C010(C3)(C010(C3)(C010(C3)(C0

Many uses for Time Switches

Use these Automatic Switches for Series Street Lighting Circuits, Automatic Substation Electric Signs, Illuminated Billboards, control of Display Window Lighting, Two Meter Service, Apartment House Lighting and for other purposes.

Send for the forty - eight illuspage trated bulletin No. 37 showing the various types of Time Switches and also the attachments which increase their usefulness.

and with the control of the control

Albert & J. M. Anderson Mfg. Co. 289-305 A St. Boston, Mass.

New York Chicago Philadelphia London



SPECIAL TRACKWORK of the famous TISCO MANGANESE STEEL

WM. WHARTON JR. & CO., INC. EASTON, PA.

Sales Offices:

Boston Chicago El Paso Montreal New York Philadelphia Pittsburgh San Francisco Scranton

. R. A HEGEMAN, Jr. President F. T. SARGENT, Secretary

B. A. HEGEMAN, First Vice-Pres. and Tress J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co. Graybar Bullding, 420 Lexington Ave., New York

BRANCH OFFICES

Munsey Bidg., Washington, D. C. 100 Boylston St., Boston, Mass. Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Pinlons
Angio-American Varnish Co.,
Varnishes, Enamels, stc.
National Hand Holds
Genesco Paint Oils
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Plows
Feasible Drop Braks Staffs
Ft. Pitt Spring & Mig. Co.,
Springs.

.

Flaxlinum Insulation Economy Electric Devices Co. Power Saving and Inspection Maters

National Safety Devices Com-pany's Whistle Blowers, Gong Ringers end Brake Hangers Godward Gas Generators

.

Cowdry Automotive Brake Testing Machine



MORE-**JONES** TROLLEY WHEELS **AND HARPS**

WE MANUFACTURE various types of trolley equipment. The quality of metal, conductivity, resistance to friction, effect on overhead, shape and size of wheel groove, have all been carefully worked out and perfected. In addition to the highly specialized V-K Oilless Trolley Wheels and Harps, More-Jones make the most complete line of lubricated trolley wheels and harps to meet all requirements. Let us quote you.

National Bearing Metals

New York, N. Y. Corporation Pittsburgh, Pa. Jersey City, N. J. Corporation Meadville, Pa. St. Louis, Mo.

Portsmonth, Va.

"MORE-JONES QUALITY PRODUCTS"

Gear Blanks
Brill Co. The J. G.
Standard Steel Works

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Works
Electric Service Supplies Co
Westinghouse E. & M. Co.

Gears and Finions
Bemis Car Truck Co
Columbia Machine Works
Electric Service Supplies Co
General Electric Co.
Nat'l Ry, Appliance Co.
R. D. Nuttall Co.

Generators
General Electric Co.
Westinghouse E. & M. Co.

Girder Buils
Bethlehem Steel Co.
Lorain Steel Co. Gongs (See Belis and Gongs)

Grease Texas Co., The

Grinders & Grinding Supplies Metal & Thermit Corp. Grinders, Portable Railway Trackwork Co.

Grinders, Portable Electric Railway Trackwork Co.

Grinding Bricks and Wheels Railway Trackwork Co. Guard Ball Clamps Lorain Steel Co. Lorain Steel Co.
Ramapo Ajax Corp.
Guard Ralls, Tee Rail &
Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guards, Trolley
Elsc. Service Supplies Co.
Ohio Brass Co.

Barps, Trolley Columbia Machine Works Elec. Service Supplies Co. National Bearing Metals

Corp.
R. D. Nuttall Co.
Ohio Brass Co.
Star Brass Works

Beadlights
Elec. Service Supplies Co.
General Electric Co.
Guide Motor Lamp Mig. Co.
Ohio Brass Co.

Headlining Columbia Machine Works Haskelits Mig. Corp.

Heaters, Bos Nichols-Lintern Co. Nichols-Liutern Co.
Reaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and
Water
Smith Heater Co., Peter

Healers, Car Stove Smith Heater Co., Peter

Helmets, Welding
Railway Trackwork Co.
Una Welding & Bonding Co. Hoists & Lifts Columbia Machine Works

Hose, Bridges Ohio Brass Co.

Ohio Brass Co.

Hose, Pnenmatic
Westinghouse Traction
Brake Co.
Instruments, Measuring,
Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Westinghouse E. & M. Co.
Insolating Cloth, Paper and
Tape

Tape General Electric Co. Irvington Varnish & Inc.

Okonite Co. Okonite-Caliender Cable Co. Westinghouse E. & M. Co.

insulating Silk
Irvington Varnish & Ios.
Co.

tnsolating Varnishes
Irvington Varnish & Ins.
Co.

Insulation (See also Paints)
Electric Ry, Equipment Co.
Elec. Service Supplies Co.
Irvington Varnish & Ins.

Co.
Okonite Co.
Okunite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulation. Heat Wood Conversion Co. Insulation, Sound-proof Wood Conversion Co. Insulation Slats
Irvington Varnish & Ins. insulator Pins
Elec. Service Supplies Co.
'Hubbard & Co.
Ohio Brass Co.

Ohio Brass Co.

Insulators (See also Line
Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins.
Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Interior Side Linings
Haskelite Mfg. Corp.
Jacks (See also Cranes,
Holsts and Litts)
Columbia Machine Works
Elec. Service Supplies Co.
Johnts, Rail

Joints, Raii (See Rail Joints) Journal Boxes

Bemis Car Truck Co.
Brill Co., The J. C.
Cincinnsti Car Co.
Lamp Guards and Pixtures
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (Sec also Headlights) General Electric Co. Westinghouse E. & M. Co.

Lamps, Signal and Marker Elec. Service Supplies Co. Nichols-Lintern Co. Lanterns, Classification Nichols-Lintern Co.

Letter Boards
Cincinnati Car Co.
Haskelite Mfg. Corp.

Lighting Fixtures
Guide Motor Lamp Mfg. Co Lighting Fixtures, Interior Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Cn.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.) Archboid-Brady Co. Archoold-Brady Co. Electric Ry. Equipment Co. Elec. Service Supplies Co. General Electric Co. Hubbard & Co. National Bearing Metals

Corp. Ohio Brass Co. Westinghouse E. & M. Co.

Locking Spring Boxes
Lorain Steel Co.
Wm. Wharton, Jr. & Co. Cincinnati Car Co.
General Electric Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Westinghouse E. & M. Co. Lobricating Engineers Universal Lubricating Co. Lobricants, Oil and Grease Texas Co., The Universal Lubricating Co.

Manganese Parts Bemis Car Truck Co. Manganese Steel Guard Ralis Ramapo Ajax Corp. Wm. Wharton Jr. & Co.

Manganese Steel Castings Lorain Steel Co.

Manganese Steel, Special Track Work Bethlehem Steel Co. Wm. Wharton, Jr. & Co. Manganese Steel Switches,

Manganese Steel Switches, Frogs and Crossings Bethlehem Steel Co. Lorain Steel Co. Ramano Ajax Corp. Wm. Wharton, Jr. & Co. Mirrare, Inside & Ontside Cincinnati Car Co. Motor Buses (See Buses) Motors, Electric General Electric Co. Westinghouse E. & M. Co.

Motor, Generators & Controls for Electric Buses General Electric Co.

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Wood Co., Chas. N.

Nuts and Bolts

Bemis Car Truck Co.
Cincinnati Car Co.
Hubbard & Co.

Oil Texas Co., The Omnibuses (See Bases) Gxy-Acetylene (See Cutting Apparatus)

Packing Westinghouse Traction Brake Co.

Paints and Varnisbes
(Insulating)
Elec. Service Supplies Co.
Irvington Varnish & Ins.

Co.

Paints & Varnishes, Railway
National Ry. Appliance Co.
Panels, Outside, Inside
Haskelite Mig. Corp.

Paving Material

American Brake Shoe & Foundry Co. Pickup, Troiley Wire Elec. Service Supplies Co. Ohio Brass Co.

Plnion Pullers
Elec. Service Supplies Co.
Wood Co., Chas. N. Pinions (See Gears)

Pins, Case Hardcoed, Wood and Iron Ohio Brass Co. Westinghouse Tractico Brake Co.

Plpe Fittings Standard Steel Works Westinghouse Tr. Brake Co. Pinners (See Machine Tools) Plates for Tee Rail Switches Ramapo Ajax Corp.

Pilers, Rubber Insulated Elec. Service Supplies Co. Plywood Roofs, Headlinings, Flours, Interior Panels, Bulkheads, Truss Planks Haskelits Mfg. Corp.

Pols Line Hardware Bethlehem Steel Co. Elec. Service Supplies Co. General Electric Co. Ohio Brass Co. Pole Reinforcing Hubbard & Co.

Hubbard & Co.
Poles, Metal Street
Bates Expanded Steel
Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.

Hubbard & Co.
Poles, Ties, Posts, Plling &
Lomber Bell Lumber Co.
Naurie Pole & Tie Co.
J. F. Prettyman & Son Poics and Ties, Treated Bell Lumber Co. J. F. Prettyman & Son

Poles, Trolley
Elec. Service Supplies Co.
R. D. Nuttall Co.
Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co. Portable Grioders Railway Trackwork Co.

Potheads Okonite Co. Okonite-Callender Cable Co.,

Power Saving Devices National Ry. Appliance Co. Pressings, Special Steel Cincinnati Car Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Traction

Brake Co. Punches, Ticket Wood Co., Chas. N.

Rail Braces and Fastenings Ramapo Ajax Corp.

Rall Grinders (See Grinders)

Rail Joints Carnegie Steel Co. Rail Joint Co.

Rail Joints, Welded Lorain Steel Co. Metal & Thermit Corp.

Rail Weiding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Rails, Steel Carnegie Steel Co. Railway Safety Switches Consolidated Car Heating

Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.

Registers and Fittings Brill Co., The J. G. Cincinnati Car Co. Elec. Service Supplies Co. Ohmer Fare Register Co.

Reinforcement, Concrete American Steel & Wire Co. Bethlehem Steel Co. Carnegie Steel Co.

Repair Shop Appliances (See also Coll Banding and Winding Machines) Co.

Repair Work (See also Colls) Westinghouse E. & M. Co.

Repair Work (See also Colls) Westinghouse E. & M. Co.

Replacers, Car Cincinnati Car Co. Elec. Service Supplies Co.

Resistances Consolidated Car Heating

General Electric Co. Resistance, Wire and Tube Westinghouse E. & M. Co. Retrievers, Trolley (See Catchers and Retrievers Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co. Roofing, Car Haskelite Mfg, Corp.

Roofs, Car and Bus Haskelits Mfg. Corp. Safety Control Devices Safety Car Devices Co. Safety Car Devices Co.
Sanders, Track
Brill Co., The J. G.
Elec, Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.
Edwards Co., O. M.

Sash. Metal Car Window Hale-Kilburn Co Edwards Co., O. M. Scrapers, Track (See Clean-ers and Scrapers, Track) Screw Drivers, Rubber Screw Brivers, Kudder Insulated Elec. Service Supplies Co. Seating Materials Brill Co., The J. G. Haskelits Mfg. Corp.

Seats, Bus Brill Co., The J. G. Hale-Kilburn Co. Seats, Car (See also Raitan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Asia Hand Equipment
Abel, G. T.
Electric Equipment Co.
Irving S. Van Loan Corp.
Salzberg, Inc., H. E. Shindes, Vestibule
Brill Co., The J. G.
Cincinnati Car Co. Shoveis

Brill Co., The J. G.

Hubbard & Co.

Shovels, Power Brill Co., The J. G.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting Consolidated Car Heating Co. Elec. Service Supplies Co. National Pneumatic Co.

Signals, Indicating Nichols-Lintern Co.

Signal Systems, Block Elec. Service Supplies Co. Nachod and United States . Electric Signal Co. Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod and United States.
Electric Signal Co.
Wood Co.. Chas. N.

Slack Adjusters (See Brake Adjusters)

Siect Wheels and Cutters
Anderson Mfg. Co., A. &
J. M.
Cincinnati Car Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Bearing Metals

R. D. Nuttall Co. Smokestacks, Car Nichole-Lintern Co.

Snew Plows
National Ry, Appliance Co. Snuw-Pluws, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Works
Consolidated Car Fender Co.

Snow Sweeper, Rattan J. G. Brill Co. Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Spikes
American Steel & Wire Co. Splicing Compounds
Westinghouse E. & M. Co. Splicing Sleeves (See Clamps and Connectors)

Springs National Ry. Appliance Co. Springs, Car and Truck
American Spiral Spring Co.
American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works

Sprinkiers, Track and Road Brili Co., The J G. Steel and Steel Products
American Steel & Wire Co.
Carnegie Steel Co.

Steps, Car Brill Co., The J. G. Cincinnati Car Co.

Stokers, Mechanical Babenek & Wilcox Co. Westinghouss E. & M. Co.

Stop Signale Nichols-Lintern Co. Storage Batteries (See Bat-terles, Storage)

teries, Storage,
Strain Insolutors
Anderson Mig. Co., A. &
J. M.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.
Street Cars (See Cars,
Passenger, Freight,
Express)

Superheaters Babcock & Wilcox Co. Sweepers, Snaw (See Snaw Plows, Sweepers and Brooms)

Switches
General Electric Co.
Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches, Selector Nichols-Lintern Co. Switches and Switchboards
Consolidated Car Heating
Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
Switches, Tee Rail
Ramano-Aiax Corp.

Ramapo-Ajax Corp. Switches, Track (See Track Special Work

Tampers, Tle Railway Trackwork Co. Tapes and Cloths (See Insu-inting Cloth, Paper and Tape)

Tee Rail Special Track Work Lorain Steel Co. Ramapo-Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co. Telephone & Telegraph Wire American Steel & Wire Co. John A. Roeblings Sons Co.

Testing Instruments (See Instruments, Measuring, Testing, etc.) Thermostnis Censolidated Car Heating

Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers Elec. Service Supplies Co

Ties and Tie Rods. Steel Carnegie Steel Co. International Steel Tie Co.

Ties, Mechanical Dayton Mechanical Tie Co. Ties, Wood Cross (Sea Poles, Ties, Posts, etc.)

Tires
Goodyear Tire Co., The
Goodrich Rubber Co.
Kelly-Springfield Tire Co.

Tokens
Johnson Fars Box Co. Tengue Switches Wm. Wharton, Jr. & Co.

(Continued on page 53)

"The Standard for Rubber Insulation"

INSULATED WIRES and CABLES

"Okonite," "Manson," and Dundee "A" "B" Tapes

Send for Handbook

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories, PASSAIC, N. J.

PATERSON, N. J.

Offices: New York Chicago Pittsburgh St. Louis Birmingham San Francisco Los Angeles Seattle

Pettingell-Andrews Co., Boston, Mass. F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Phila., Pa.

Con. Rep.: Engineering Materials Limited, Montreal, Cuben Rep.: Victor G. Mendoza Co., Havana.

Arc Weld ail Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

CHICAGO, NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADEL-PHIA, PITTSBUROH, BUFFALO, DETROIT, CINCINNATI, BALTIMORE, WILKES-BARRE, ST LOUIS, KANSAS CITY, ST. PAUL, OKLAHOMA CITY, BIRMINGHAM, MEMPHIS, DALLAS, ATLANTA, DERVER, SALT LAKE CITY EXPORT REPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK PACIFIC COAST REPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LOS ANOELES, PORTLAND, SEATTLE.



Boyerized Parts:

Brake Pins
Brake Hangers
Brake Levers
Prodestal Glubs
Brake Fulcrums
Brake Fulcrums
Control Bearings
Side Bearings
MeArthur

Brake Pins
Spring Post Bushings
Spring Posts
Spring Posts
Spring Posts
Manganess Truck
Manganess Truck Parts
Bushings
Side Bearings
MeArthur
Turnbuckles

Cau be purchased through the following representatives:

- F. F. Redler, 903 Monadnock Bldg., San Francisco, Cal.
- W. F. McKenney, 54 First Street, Portland, Oragon.
- J. H. Denton, 1328 Broadway, New York City, N. Y.
- A. W. Arlin, 519 Delta Bidg., Los Angeles, Cal.

Bemis Car Truck Company Springfield, Mass.



5.maanaaaaaaaaaaaaaaaaaaaaaaaaaa

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 20-32 West Randolph Street. Cincinnati, Tractico Bldg.: New York, 190 E. 42nd St.









Rod, Wire and Cable Products

ANACONDA COPPER MINING COMPANY THE AMERICAN BRASS COMPANY General Offices - 25 Broadway, New York

NACONDA TROLLEY WIRE

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off. Made of extra quality stock firmly braided and smoothly finished Carefully inspected and guaranteed free from flaws.

Samples and information gladly sent.

SAMSON CORDAGE WORKS. BOSTON, MASS.

Your Name

in this space in all issues where larger display space is not used backs up your advertising campaign and keeps your name in the alphabetical index.

RAIL GRINDERS AND WELDERS

Railway Track-work Co., Philadelphia







amminiminiminimi

The DIFFERENTIAL CAR



Standard on 60 Railways for

Track Maintenance
Track Construction
Ash Disposal
Coal Hauling
Concrete Materials
Waste Handling
Excavated Meterials
Hauling Cross Tles
Snow Disposal

Use These Labor Savers

Differential Crane Car Clark Concrete Breaker Differential 3-way Auto Truck Body Differential Car Wheel Truck and Tractor

THE DIFFERENTIAL STEEL CAR CO., Findlay, O.

THE WORLD'S STANDARD

"IRVINGTON"

Varnished Silk, Varnished Cambric, Varnished Paper

Flexible Varnished Tubing Irv-O-Slot Insulation Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co. Irvington, N. J.

Sales Representatives:

Mitchell-Rand Mfg. Co., N. Y.
E. M. Wolcott, Rochester
I. W. Levine, Montreal
A. L. Gillies, Toronto
Consumers' Rubber Co., Cleveland



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment The Universal Lubricating Co.

Cleveland, Ohio Chicago Representatives: Jameson-Ross Company.
Straus Bldg.



BOXES for BUSES

Let us tell you of this especially designed box for this class of service.

The Cleveland Fare Box Co. 4900 Lexington Ave., Cleveland, O.

Cacadian Cleveland Fare Box Co., Ltd. Preston, Ontarin

COUNTING And Sorting Machines CARRIERS Tokens

RAIL JOINTS

The Rail Joint Company 165 Broadway, New York City

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Least Maintenance

Lightest Weight Greatest Adaptability

and control co

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO. CINCINNATI, OHIO

New York City, 30 Church Street

COSTICULTURANI (COSTICULTOS CONTESTICULOS COSTICULTOS COSTICULTOS CONTESTICOS CONTE

Better Quality Seats For Cars and Buses

Hale-Kilburn Co. 1800 Lehigh Ave., Philadelphia, Pa



Car Heating and Ventilating

are no longer operating problems. We can show you how to take care of both with one equipment. The Poter Smith Forced Ventilation Hot Air Heater will save, in addition, 40% to 60% of the cost of any other car heating and rentilating system. Write for details.

The Peter Smith Heater Company 6209 Hamilton Ave., Detroit, Mich.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc. 101 Park Avenue, New York City



HEATERS REGULATORS VENTILATORS

2241-2247 India: Chleago, Ill.

1328 Broadwa

ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every eare is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Page:	Page	Page	Page
Abel, G. T	Edwards Co., O. M	Kelker, DeLeuw & Co	Richey, Albert
American Electrical Works. 51 American Steel & Wire Co. 51 American Steel Foundries. 4 Anaeonda Copper Mining Co. 51 Anderson Mfg. Co. A. & J. M., 49	Electric Service Supplies Co 9 Faile & Co., E. H	54 and Third Cover Lang Body Co., The32-33 Lorain Steel Co53	Safety Car Devices Co. 10 Salzberg Co., Inc., H. E. 47 Samson Cordage Works. 51 Sanderson & Porter. 44
Babcock & Wilcox Cn 45 Bates Expanded Steel Truss Co 51 Beeler Organization 44 Bell Lumber Co 45 Bemis Car Truck Co 51	"For Sale" Ads	McClellan & Junkersfeld 44 McGovern, Halsey 45 Mack Trucks, Inc Front Cover Metal & Thermit Corp. 17 Nachod and U. S. Signal Co 51	Searchlight Section 47 Smith Heater Co., Peter. 52 Standard Steel Works 60 Star Brass Works 53 Stevens & Wood, Inc. 44 Stone & Webster 44 Storic Construction 44
Bethlehem Steel Co	Goodyear Tire & Rubber Co30-31 Graham Bros Insert 25-26-27-28 Griffin Wheel Co	National Bearing Metals Corp. 49 National Brake Co., Inc	Stucki Co., A
Buchanan & Layng Corp 44		National Ry. Appliance Co 49 Naugle Pole & Tie Co 45	Una Welding & Bonding Co 45 Universal Lubricating Co 52
Carnegie Steel Co	Hale-Kilburn Co. 52 Haskelite Mfg. Corp. 45 "Help Wanted" Ads. 47	Nichols Lintern Co	Van Loan Corp., Irving 47
Cincinnati Car Co	Hemphill & Wells	Oakite Products, Inc. 46 Ohio Brass Co. 5 Okonite-Callender Cable pany, Inc., The. 51 Okonite Co., The. 51	"Want" Ads
Consolidated Car Fender Co 45 Consolidated Car Heating Co 43	Illinois Steel Co	Perey Mfg. Co., Inc	Westinghouse Traction Brake Co. 8 Wharton, Jr. & Co., Inc., Wm. 49 "What and Where to Buy", 48-50-53
Day & Zimmermann, Inc 44 Dayton Mechanical Tie Co., Insert 37-38	Irvington Varnish & Insulator Co	Prettyman & Sons, J. F	White Eng. Corp., The J. G 44 Willard Storage Battery Co 22 Wish Service, The P. Edw 45
Detroit, City of (Dept of St. Railways)	Jackson, Walter 44 Johnson Fare Box Co 49	Railway Track-Work Co. 51 Railway Utility Co. 52 Ramapo Ajax Corp. 52	Wood Conversion Co 46 Yellow Truck & Coach Co14-15

WHAT AND WHERE TO BUY—Continued from page 50

Trucks, Motor White Company

Tools, Track & Miscellaneous
American Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Hubbard & Co.
Railway Trackwork Co.
Bamspo-Ajax Corp. Towers and Transmission Structurs American Bridge Co. Bates Expanded Steel Truss Co. Westinghouse E. & M. Co. Westinghouse E. & M. C Track Grinder
Metal & Thermit Corp.
Railway Trackwork Co.
Ramapo-Ajax Corp.
Track, Special Work
Columbia Machine Wor
Ramapo Ajax Corp.
Trackless Trolley Cars
Brill Co.. The J. G.
Transfer Issuing Machines Transfer Issuing Machines Ohmer Fars Register Co. Transformers
General Electric Co.
Westinghouse E. & M. Co. Treads, Safety Stair, Car Step Cincinnati Car Co.

Tree Wire Bridgeport Brass Co.

Trolley Bases
National Bearing Metals
Corp.
R. D. Nuttall Co.
Ohio Brass Co. Trolley Bases, Retrieving
R. D. Nuttall Co.
Ohio Brass Co. Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co. Trolley Material, Overhead Anderson Mfg. Co., A. & J. M.
Elec, Service Supplies Co.
General Electric Co.
National Bearing Metals National Bearing Metals Corp. Ohio Brass Co. Westinghouse E. & M. Co. Trolley Wheel Bushings National Bearing Metals Corp. Star Brass Works Star Brass Works
Trolley Wheels (Ses Wheels
Trolley Wire
Amer. Electrical Works
American Brass Co.
American Steel & Wirs Co.
Anaconda Copper Min. Co.
Roebling's Sous Co., J. A.

White Company
Truss Planks
Haskelite Mfg. Corp.
Tubing, Yellow and Black
Flexible Varnish
Irvington Varnish & Ins.
Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co. Turntables Elec. Service Supplies Co. Turnstiles
Elec. Service Supplies Co.
Perey Mig. Co., Inc. Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co Varnished Papers and Silks Irvington Varnish & Ins. Ventilators, Car Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Heating Co.
Nichols-Lintern Co.
Nat'l. Ry. Appliance Co.
Railway Utility Co.
Vestibula Linings
Haskelite Mfg. Corp. Welded Rall Joints
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co. Free Wire

Bridgeport Brass Co.

Okonite Co.

Okonite-Callender Cable Co.

Trucks, Car

Bemis Car Truck Co.

Brill Co., The J. G.

Cincinnati Car Co.

Seattle

Welders, Portable Electric General Electric Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.

Welders, Rail Joint General Electric Co. Ohio Brass Co. Railway Trackwork Co.

Mailway Trackwork Co.
Welding Processes and
Apparatus
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.
Welding Steel

Welding, Steel Railway Trackwork Co. Una Welding & Bonding Co. Welding Wire American Steel & Wire Co. Railway Trackwork Co. Roebling's Sons Co.. J. A.

Welding Wire and Rods Railway Trackwork Co. Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools) Wheels, Car, Steel & Steel

American Steel Foundries Bemis Car Truck Co.

Carnegie Steel Co. Griffin Wheel Co. Standard Steel Works

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Bearing Metals

National Corporation of Corporation

Carnegue Steel Co.
Whistles, Air
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Traction
Brake Co.
Window Goards & Fittinge
Cincinnati Car Co.

Wire Rope American Steel & Wire Co. Roebling's Sons Co., J. A.

Roebling's Sons Co., J. A.
Wires and Cables
American Brass Co.
American Electrical Works
American Steel & Wire Co.
Anaconda Copper Mio, Co.
Bridgeport Brass Co.
General Electric Co.
Okonite Co.
Okonte-Callender Cable Colinc.

Inc.
Rosbling's Sons Co., J. A
Westinghouse E. & M. Co

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa. Sales Offices:

Chicago Cleveland Atlanta New York Pittshurgh Philadelphia Dallas Pacific Coast Representative:
United States Steel Products Company
Portland San Francisco

Export Representative:
United States Steel Products Company, New York, N. Y. 21111111111111

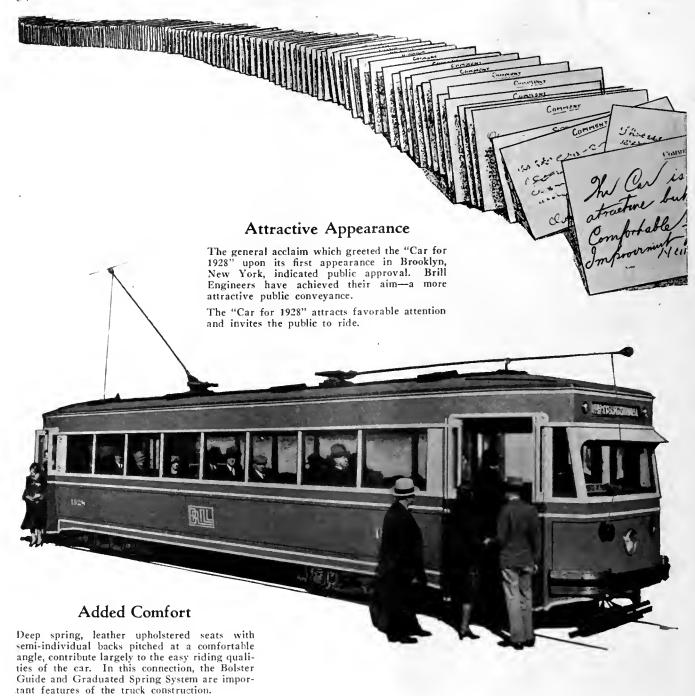
Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



.

THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.



Public favor—the key to increased revenue

The public is the final judge of the merits of any transportation system. By winning public favor, success is assured.

Thousands of comment cards were received from Brooklyn residents who had examined and ridden in this latest development in electric cars. The consensus of opinion seems to be well summed up in the comments on the opposite page.



The public's endorsement of the

"Car for 1928" CUMMENT COMMENT This is the most comfortable on the trolley I have The new cars certainly will will attract a num tomobiles moleri Tenis thing for the bubble for speed an Behind the "Car for 1928" 11- 1 Hugher The J. G. Brill Company Philadelphia American Car Company St. Louis The G. C. Kuhlman Car Co. Cleveland Wason Manufacturing Co. Springfield, Mass.

Waukesha-Powered Walter, Snow Fighter Turning Over Four-Foot Drift



Snow Fighting with Gasoline

In our northern border states snow fighting is a terrifying problem to operating officials. Bus transportation must operate both summer and winter. The Colonial Coach Lines operate over 750 miles of road in New York State. During the winter their snow fighters keep 350 miles of road open, and they do it even though drifts from five to twelve feet deep are encountered.

> In the illustration above a Walter Snow Fighter is shown plowing through four-foot snow drifts at twenty miles an hour. Such speed accounts for the unusual daily mileage obtained by these plows. To do this with their four-wheel drive requires a powerful, reliable engine that must run in blizzard weather for days without a stop. Waukesha "Ricardo Head" heavy-duty engines have a reputation for unrivalled reliability and economy as well as power.

A-806-LC

AUTOMOTIVE EQUIPMENT DIVISION

WAUKESHA MOTOR

COMPAN Wisconsin

Waukesha Eastern Sales Offices

Eight W. 40th Street

New York City

MAINTENANCE AND CONSTRUCTION ISSUE

ELECTRIC RAILWAY JOURNAL

Graw-Hill Publishing Company, Inc.

FEBRUARY 18, 1928

Twenty Cents per Copy

FASTER TRACK CONSTRUCTION

Is it reconstruction, or a new line? Wherever paved track is being built there's a cry for speed everywhere. The city authorities, the Transportation Department of the Railway, the car riders, the street users,—all say "speed up." Good will was never built by slow, long-drawn out, wasteful, unnecessary methods of track construction.

There is a way-to "speed up" paved

track construction:—Modern production methods, modern equipment and Steel Twin Ties.

And the surprising part of it is that modern methods and Steel Twin Ties make a better, cheaper, more lasting paved track construction!

Write today for delivered prices for your 1928 track program.

THE INTERNATIONAL STEEL TIE CO. CLEVELAND, OHIO

STEEL TWIN TIE TRACK



"Ready-To-Wear"



There is a suit of Armature-Insulation clothes for every Westinghouse Railway Motor.

These suits are machine cut to the original design dimensions, thereby producing a uniform product at a reasonable price.

Cutting Insulation by hand is expensive.

A chart, showing the position of each piece, can be obtained by writing to, or calling, our nearest office.

Westinghouse Electric & Manufacturing Company East Pittsburgh Pennsylvania Sales Offices in All Principal Cities of the United States and Foreign Countries



Westinghouse

MORKIS BUCK Managina Editor JOHN A. MILLER, Ja. Associate Editor CLARENCE W. SQUIER Associate Editor G. W. JAMES, JR.

GEGIRIC RAILWA

CHARLES GORDON, Editor

HENRY W. BLAKE Senior Editor GEORGE J. MACMURRAY News Editor

PAUL WOOTON Washington Correspondent ALEX McCALLUM Editorial Representative London, England

Vol. 71 No. 7

CONTENTS

Pages 265-306

FEBRUARY 18, 1928

Cumulative Honors

RARELY does a publication find itself announcing to its readers, in one issue, two such signal honors to a publisher and a paper as those presented elsewhere in this number of the JOURNAL.

In printing simultaneously the news of the Associated Business Papers, Inc., award to Electric Railway Journal and of the Bok award to James H. McGraw, its publisher and guiding genius through more than 40 years of service to an industry, there is the feeling that our readers join with us in our justifiable pride and deep gratification.

Effort spent in raising the standards of the business or profession of which one is a part brings its own reward through the satisfaction that the real builder derives from his work. When in addition there come almost simultaneously two such evidences of national recognition, the occasion constitutes an unusual climax to a generation of effort devoted to the upbuilding of publishing standards and to the service of American business.

McGRAW-HILL PUBLISHING COMPANY, INC.

Tenth Avenue at 36th Street, New York, N. Y. New York District Office, 285 Madison Ave. Cable Address: "Macbinist, N. Y."

JAMES H. MCGRAW, President
JAMES H. MCGRAW, President
JAMES H. MCGRAW, JE., V.-P., and Treas.
MALCOLM MUIN, Vice-President
EDWARD J. MERERN, Vice-President
EDWARD AND SETTION, Vice-President
EDWAR KORAK, Vice-President
C. H. THOMPSON, Secretary

Washington: National Press Building CHIOAUO: 7 S. Dearborn Street

PHILADELPHIA: 1600 Arch St. CLEVELAND: Guardian Building

Guardian Building
St. Louid:
Beil Telephone Building
San Francisco:
883 Mission Street

Publishers of Engineering News-Record American Machinist Power Chemical and Metallurgical Engineering

emical and Metallur givol Engineer
Cool Age
Engineering and Mining Jaurnal
Ingenieria Internacional
Bus Transportation
Electric Roilwood Journal
Electrical World all
Electrical Merehandising
Radio Retalling
Construction Methods

Electrical West (Published in Son Francisco)

Agricol Vest
(Published in Son Francisco)
London;
6 Bouverie Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations
The annuel subscription rate is \$4 in the United States, Canada, Mexico, Alasks, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brasil, Spain, Uruguay, Costa Rica, Ecuador, Quetemaia, Chile and Paraguay. Estra foreign postage to other countries \$3 (total \$7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address.

part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address
must be given, notice to be received at least ten days before the change takes place.

Copyright, 1928, by McGraw-Hill Publishing Compeny, inc.

Published weekly. Entered as second-class matter, June 33, 1908, at the Post Office
at New York, N. Y., under the Act of March 3, 1819. Printed in U. S. A.





No. 633

Porcelain you can install - and forget

- because science—not tradition governs the making of all Westinghouse porcelain and insulators.
- -precision processes, at every stage, are the rule.
- never is anything taken for granted at any time.
- even slight variations in raw materials are compensated for.

First the design-then the materials-then the method-and then, a vigilance that permits no compromise.

pendable—and maintenance a minimum —the insulators supporting the suspension must have strength;--strength to carry the heavy contact wires and messengers, strength to withstand the pounding of the trolley shoe, strength for the increased strain when wind and ice add pressure and weight, and in addition strength in reserve for the unusual conditions that no one can foresee.

Strength in reserve is the factor that makes long life—and keeps the overhead lines up.

Westinghouse developed insulator No. 633 with strength in reserve especially for railroad electrification. The working load recommended for insulator No. 633 is 9.000 pounds, but its rated combined M & E strength is 27,000 pounds.

Westinghouse insulator No. 633 has a reserve ratio of 3 to 1; for safety, for long life, to keep your overhead lines UP—and your financial overhead down.

> Westinghouse Electric & Manufacturing Company Derry (Pa.) Works Emeryville (Calif.) Plant Sales Offices in All Principal Cities of the United States and Foreign Countries

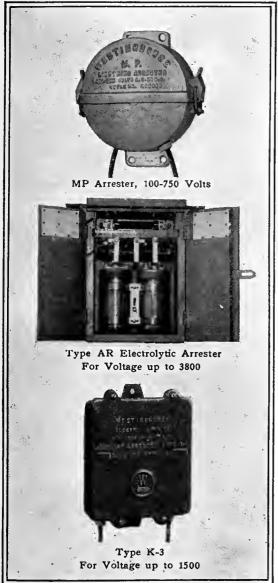


Porcelain Insulators

Assured Protection

for your cars—your line—your stations is obtained by installing

Westinghouse Direct-Current Lightning Arresters



MP Arrester

This low-priced arrester is adequate for the protection of cars under all ordinary conditions, one to the car and five to the mile of line. It is easy to install and, once installed, requires practically no attention.

The MP arrester has a long life and affords greater freedom of discharge than any other type using series resistance.

For extra severe 600-volt, and all 1200 and 1500-volt service, for car and pole mounting, we recommend the

AR Arrester

This is an electrolytic arrester having a high discharge capacity. It is recommended for station service where it can easily be given the required periodic maintenance and is not subjected to freezing temperatures. It is also used extensively on cars.

K-3 Arrester

This is a condenser arrester of high capacity. It requires no attention whatever after installation. It stays on the cars the year round, having no liquids to freeze, no moving parts to wear out, and no glass parts to break.

For further details ask for a copy of Descriptive Leaflet 20021.

Westinghouse Electric & Manufacturing Company East Pittsburgh Pennsylvania

Sales Officea in All Principal Cities of the United States and Foreign Countries



Westinghouse

BETTER RAIL, BETTER TRANSPORTATION

Cut costs at the source

Many a dollar of hard-won revenue goes to repair damage that could have been prevented.

Many a car maintenance job is due to poor track.

Many a repaying job is due to inadequate rail maintenance.

To make a little maintenance money go farthest, grind out corrugations, Atlas Arc Weld low joints and grind them with the equipment shown here. It's what the most successful roads are using.

Complete details on the complete line—get them.

Railway Track-work Co.

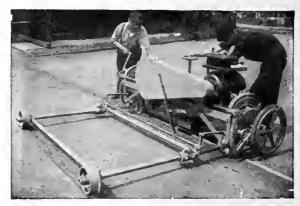
3132-48 East Thompson Street, Philadelphia

AGENTS
Chester F, Gailor, 30 Church St., New York
Chas, N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
H. F. McDermott, 208 S. LaSalle St., Chicago
P. W. Wood Railway Supply Co., New Orleans, La.
Equipment & Engineering Co., London
Frazar & Co., Japan

D 2345



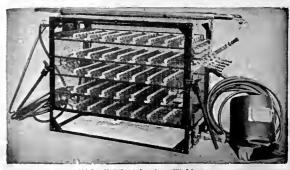
Eureka Radial Rail Grinder



Vulcan Rail Grinder



Reciprocating Track Grinder



"Ajax" Electric Arc Weider

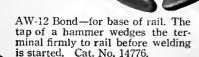


O-B Copper Arc-Weld Bonds



Titon Bond—for rail head application on standard joints. Note large steel terminals. Cat. No. 14841.

Hevi-bede Titon Bond—especially designed for heavily beaded and Weber type joints. Cat. No. 15269.



CHICAGO

REVENUE producing capacity, plus reliability in delivering the full rated return expected—these are the measuring sticks which largely determine the value of any bond.

Judged from *either* standpoint, good rail bonds are worth many times the money invested in their purchase and installation cost. For when correctly designed and made, to permit easy installation and to insure low electrical resistance in the track circuit over a period of years, rail bonds help you make many worth while savings in operating costs. Furthermore, they are an important factor in providing the type of service that attracts more riders, since good bonding is essential to increased speeds and uniform headways.

The three O-B Copper Arc Weld Bonds shown here are provided with design and construction features which make good bonding easier. Every detail has been worked out in a way that insures a good strong weld, large contact area, permanently low resistance and long life. These results are obtained with the minimum of time and effort required in installation. Ask your O-B Salesman for a sample bond and complete information. Or address

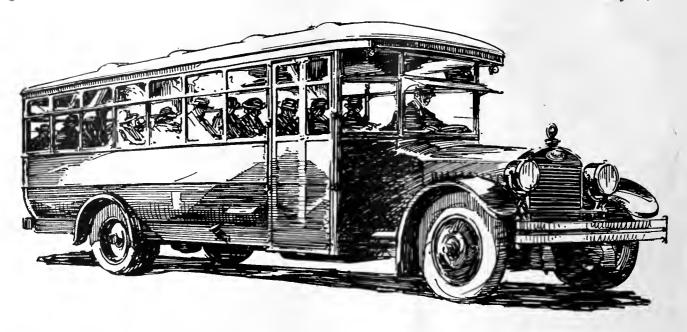
Ohio Brass Company, Mansfield, Ohio Canadian Ohio Brass Co.. Limited Niagara Falls, Canada

LOS ANGELES



SAN FRANCISCO

PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS CAR EQUIPMENT MINING MATERIALS VALVES



For Coach Operation

WESTINGHOUSE AIR BRAKES—

- —increase revenue by facilitating the use of vehicles of higher carrying capacity, and permitting higher schedule speeds in safety.
- —save time by allowing drivers to confidently hold close formation in traffic lanes, eliminating the annoying small car cut-ins from side lanes.
- —make for satisfied drivers, by minimizing physical effort in braking—one of the most arduous operations of modern coach control.
- —stimulate public confidence in the stopping ability of the modern heavy coach whose power and speed rivals that of the trimmest roadster.



Westinghouse Automotive Air Brakes have been adopted as standard equipment by leading manufacturers.

WESTINGHOUSE TRACTION BRAKE COMPANY
Automotive Brake Division: WILMERDING, PENNA.



Golden Glow



And good lighting plays an all-important part in providing better service and in making the modern car more attractive, more business-like, more profitable.

Send for our latest pamphlets to learn about the business-building possibilities of Golden Glow Headlights.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA: District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Avo., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES Co.

MANUFACTURER OF RAILWAY POWER

All types of Golden Glow Railway Headlights may be fitted with refracting lenses, as illustrated.

AND INDUSTRIAL ELECTRICAL MATERIAL





900-D Double Rotating Chair

In combination plush and leather with deep individual seat cushions and divided back. For buses and double-end interurban cars.



900-D

Double Stationary Chair
In combination plush and leather with deep individual seat cushions and divided back. For buses and single-end interurban cars.

Chairs for modern interurban cars

Hale & Kilburn Seats are designed primarily for passenger comfort—the essential characteristic for selling rides in modern interurban service.

Among the many recent H & K 900-D installations on progressive roads are:

Chicago & Joliet—Washington, Baltimore & Annapolis—Chicago, North Shore & Milwaukee—Texas Electric—Cincinnati, Hamilton, & Dayton—Chicago, South Shore & South Bend-Rochester & Syracuse - Georgia Power Co. - Chicago, Aurora & Elgin-Northern Ohio P. &

If you, too, have a new car program or a remodeling program, you will find an H & K Seat to meet your requirements.

Ask for a consultation with one of our representatives.

HALE & KILBURN COMPANY

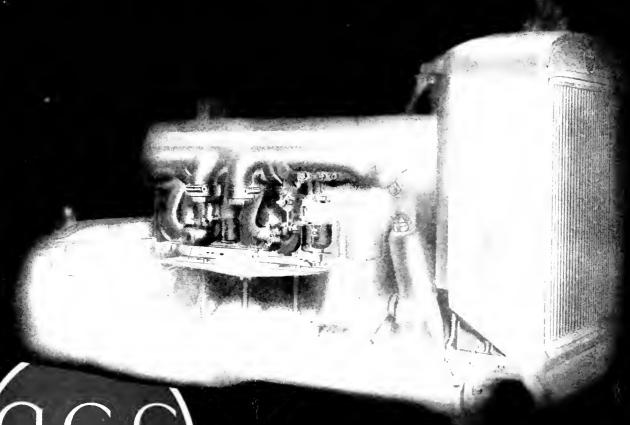
General Offices and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York
Hale & Kilburn Co., McCormick Bldg., Chicago
E. A. Thornwell, Candler Bldg., Atlanta
Frank F. Bodler, 903 Monadnock Bldg., San Francisco
H. M. Euler, 148 N. Sixth St. Portland, Oregon

ale and

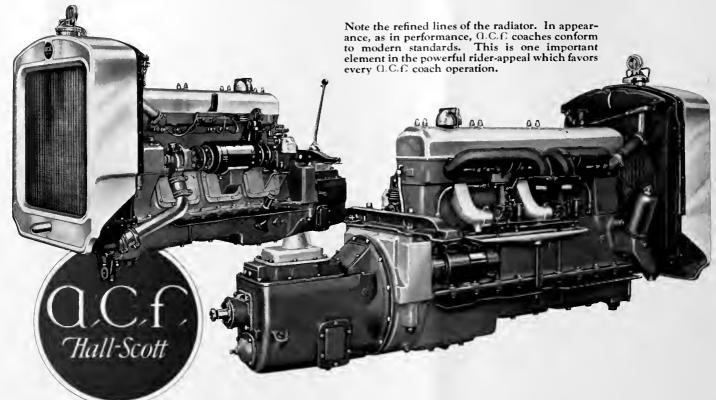
Internally Better



(Thall-Scott

Without increasing fuel consumption, without increasing the bore and stroke, without adding weight, O.C. C. coaches have been given fully 15% more power, snappier acceleration, better flexibility greater freedom from gear-shifting and still more certainty of smooth, continuous, economical operation on-schedule.

Characteristic of the thoroughgoing, out-and-out transportation standards which govern Ω C C is the fact that these latest betterments can be readily applied to the engines of older Q, C, C coaches! Operators fitly term Q, C, C Hall-Scott engines "the motors that never grow old."



EVERY coach operator striving for the most scientific basis of operation—for a high-income, revenue-transportation basis—is interested in latest O. C. C. betterments.

Two Carbureters

More power and more responsiveness throughout the throttle-range are made possible by the use of two carbureters and twin intake manifolds. The ordinary limitations and the need for compromise are gone. Virtually all of the engine's work is done within the highefficiency range of the carbureters.

New Cylinder Head

At all speeds, volumetric efficiency is notably improved, effecting a full 15% power increase without an increase—or with even a decrease—in fuel consumption. Better combustion still further minimizes carbon formation, and aids the self-contained Hall-Scott "oil-refinery" system in eliminating dilution.

Perfected Cooling

With the development of new manifolding and new combustion chambers came the opportunity for advanced design in controlling engine temperatures. Uniformity is more nearly certain than ever. Valves are cooled in a way which insures a much greater safety margin. The mixture is RIGHT throughout the widest range of conditions.

For Older Engines

The unit-assembly plan on which Q. C. C. Hall-Scott engines are built makes it possible to modernize even early engines, so that it is always practical for the Q. C. C. operator to take advantage of the latest engineering. At nominal cost every part which enters into the latest Q. C. C. performance achievements can be installed quickly and easily.

The unit-assembly Hall-Scott engine design means virtually unlimited life for an O. C. f. power-plant. That's the revenue-transportation viewpoint of O. C. f., the result of years of experience building steam railroad and electric railway equipment.

Any operator can meet his needs from the complete Q. C. f. line.

American Car and Foundry Motors Company

30 Church Street, New York



MODERNIZE

PNEUMATIZE

TREADLE-IZE

"CONSTANTLY BETTER"

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works: Rahway, New Jersey

CHICAGO 518 McCormick Building MANUFACTURED IN
TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.,

PHILADELPHIA
1010 Colonial Trust Building

After all, transpomost insistent ba Salesmanship can here as it has do

E believe that. And a good many leaders in our industry have proved it, judging by the uniform excellence of briefs submitted for the Coffin Award last year.

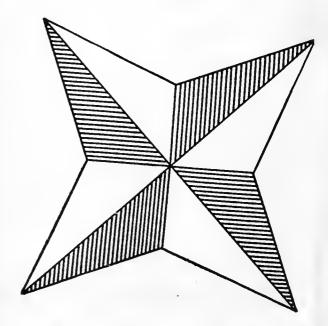
To the man of vision the Electric Railway Industry is an industry of the future and not the past. Transportation is today's most insistent basic demand. And the lion's share of the business can logically be won by the electric railways, provided the service is raised to a leadership standard, and its merchandising put on a twentieth century basis.

Cars, of course, are the backbone. And car builders have progressed far along the road. It remains for progressive

rtation is today's sic demand . . . win the market ne elsewhere /

executives and far-sighted financiers to take the bull by the horns and open wide the gates to a future of attainment.

CINCINNATI CAR COMPANY Cincinnati, Ohio



CINCINNATI BALANCED CARS

-still a step ahead of the modern trend.



Counts Big When Storms Rage

LASTING strength is the outstanding feature of *International* Creosoted Pine Poles.

There is no gradual decrease in strength due to decay or weakening due to birds or termite attacks. When storms rage and the greatest strains come, they are conquered by the full strength of Yellow Pine—the strongest of pole woods.

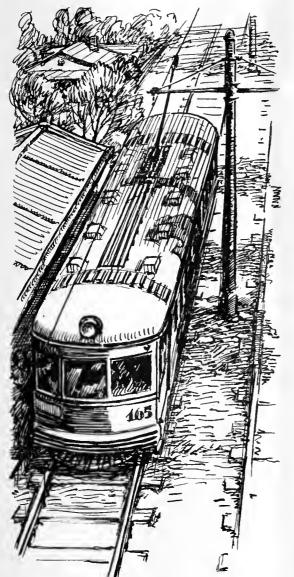
When you build your line — build with International Creosoted Pine.

International Creosoting & Construction Co.

General Offices—Galveston, Texas



International Pressure Creosofed Yellow Pine Poles



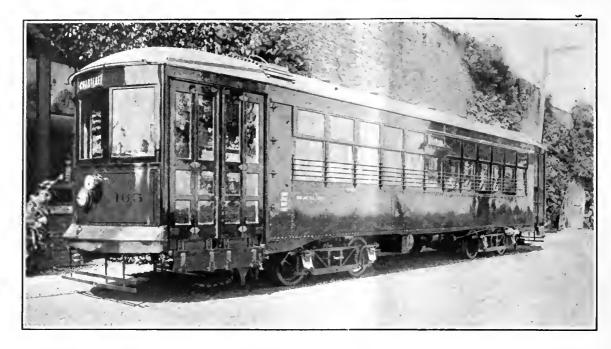
IN FAST INTERURBAN SERVICE—

How about your wheels?

Standard Wheels carry hundreds of thousands of passengers to the cities and back again every day. The speeds and quick stops necessary to maintain competitive schedules put unusual tax on wheel stamina.

Standard Wheels hold up!





Modern Cars will pay their own way

It is a well-known fact that modern cars make for greater revenue as well as lower upkeep. Attractive design, comfortable riding, and fast operation invariably attract passengers.

Cars of this type that we have built are showing increased net earnings that will pay for the investment in five years.

CUMMINGS CAR AND COACH CO.

Successors to McGuire-Cummings Mfg. Co.

111 W. Monroe St., Chicago, Ill.





The Hyatt Roller Bearing—Railway Type. Solid inner and outer races with dual roller assemblies, all made from the finest Alloy Steel, specially heat treated to produce the highest degree of toughness, and to give the utmost of durability and dependability.

Note the helically wound rollers—a distinctive feature. Due to their microscopic flexure under load they nullify shocks and strains and assure remarkably long bearing life.

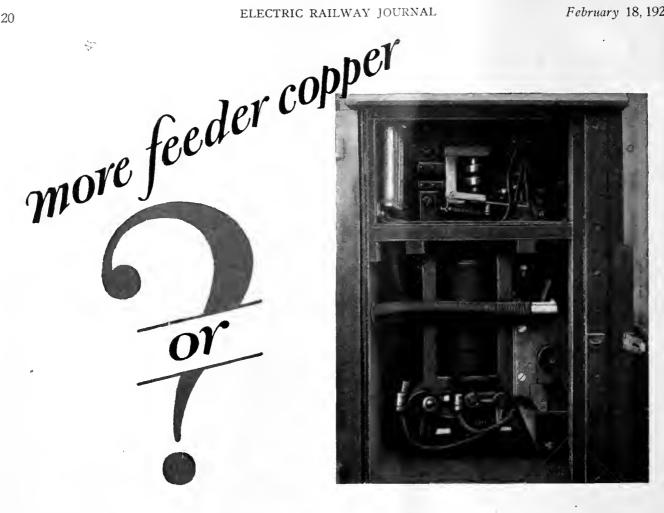
Existing equipment can be readily and effectively modernized by the adoption of Hyatt Roller Bearing Journal Boxes. They meet every A. E. R. A. standard.

With Hyatts, easier starting and smoother running are assured. The sturdy rollers turn with the wheels in a natural, easy motion—reducing friction and wear and cutting power costs appreciably. A periodic inspection of oil, every several thousand miles, is the only attention they require.

There are many other operating economies which result from the application of Hyatt equipped journal boxes—as any user will testify. Ask a Hyatt railway engineer for details.

HYATT ROLLER BEARING COMPANY
Newark Chicago Detroit Pittsburgh Oakland

PRODUCT OF GENERAL MOTORS



G-E Automatic Sectionalizing Switches

Dozens of electric railways have taken advantage of this economic alternative; others have it included in their plans for improved distribution.

G-E Automatic Sectionalizing Switches tie feeder sections together, to equalize voltage conditions and obtain for the entire system the maximum usefulness of the total feeder-copper capacity.

At the same time they act as automatic breakers to cut out any section where there is a "short" or dangerous overload, then automatically close to re-establish connection between the sections when normal conditions are restored.



General Electric representatives will gladly investigate your conditions to determine if Automatic Sectionalizing Switches can be applied to advantage.



Modern Equipment Standards

GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, February 18, 1928

Number 7

Electric Railway Journal Wins National Award for Outstanding Service to Its Industry

by the Associated Business Papers, Inc., to the business paper contributing the most definite and outstanding service to the field with which the publication is connected has been won by ELECTRIC RAILWAY JOURNAL. Announcement of this signal honor was made on Feb. 10 at a combined meeting of the National Conference of Business Paper Editors and the Educational Committee of the Associated Business Papers, Inc., held last Friday in Boston.

Briefs were submitted in this contest by 21 business publications serving as many different industries. The Associated Business Papers, Inc., which established the award, and under whose auspices the contest was conducted, includes in its membership 126 of the leading business papers published in the United States and Canada. The jury of award, consisting of Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C.; James W. Brown, publisher Editor and Publisher; David Beecroft, vice-president Chilton Class Journal Company; William M. Richardson, chairman business paper committee American Association of Advertising Agencies, and W. A. Wolff, former president of the National Industrial Advertisers' Association, reached its decision unanimously.

In announcing the award the committee directed attention particularly to the service rendered by the winning paper in assuming the responsibility of leadership and in campaigning courageously for practices and policies which were considered in the best interests of its industry. This campaign, the committee found, was carried out by articles, editorials and original investigations published in the paper, and by numerous speeches and talks made by members of the editorial staff. Through this activity

the paper was instrumental in helping its industry to see in better perspective some of the conditions and practices which affect its welfare.

ELECTRIC RAILWAY JOURNAL is naturally gratified at being made the first recipient of this award which might be compared to the Coffin prize in the electric railway field. It is also pleased that it has been the means of drawing attention nationally, among business paper publishers, to the electric railway industry and to the heroic struggle which that industry has been making to overcome the seemingly insurmountable difficulties which all but overwhelmed it during the war and post-war periods. The story of the electric railway industry during the past decade is a story of industrial romance. It constitutes an epic of faith, courage and determination, maintained in the face of heavy and cumulative odds. The JOURNAL's part has been that of inspiring the industry to greater effort and broader vision as one difficulty after another threatened to overwhelm it. But after all, it is the industry itself which is winning the battle. It is the industry itself, and the men who constitute its executives and leaders that have encouraged the JOURNAL in its program of pointing out the road toward progress; that have counseled with the paper's editors and have contributed their best thought to its columns.

The A.B.P. Award is therefore not so much an honor for the JOURNAL as for the electric railway industry. It is for that reason that the result of the contest is particularly gratifying. In sharing this recognition with its industry it is ELECTRIC RAILWAY JOURNAL'S hope that this may prove to be merely another milestone in the march of local transportation companies toward better public understanding of their problems and, in a measure, justification of the faith that inspired the industry's leaders to stick to their guns when the outlook was darkest.

Short Cuts Are Dangerous

BUSINESS has better control of the economic, social and financial forces that are at work in its intensely complicated structure than ever before in the history of the world. There is no question but that its ethical plane has moved upward constantly and that it may be expected to move still higher. But every now and then the pressure for profit leads individuals or business enterprises to attempt short cuts and to follow the lure of expediency rather than the clearly designated road of sound business principles.

These are the things that John D. Rockefeller, Jr., undoubtedly had in mind in his remarks on the occasion of his appearance before the Senate hearing in the oil investigation. In a few words he expresses a creed to which all business men, and particularly big business, may well subscribe:

"I believe in the business of the country. I believe that business can be run only on a sound, high, fair basis. As a stockholder in any company, I want no profit derived from compromise with right. I want no officer in any company in which I own stock, whether he be high or low as an employee, to do anything that I would not myself be willing to do."

These and other things that Mr. Rockefeller said have been widely quoted. His statement did his associates and the country at large a real service. It reflects with credit his vision and his appreciation of the consequence of any course that appears to defy vested authority or public opinion, however well fortified by legal barriers the case may be.

These things are recited in terms of Mr. Rockefeller's remarks only because he is the vehicle that happens to have directed widespread national attention to this sane and healthy viewpoint. Business integrity exists only as business itself puts it there. The electric railway industry long ago learned the folly of short cuts from sound principles. Its aim today is to earn a fair profit only as it may do so through a just return for a useful service rendered to the public, with adequate wages to its employees and with insistence upon those relations between employer and employee which recognize the rights of both. The progress that has been made by many properties in establishing an entente cordiale with the public on the one hand and their employees upon whom the success of their operations depend, on the other, testifies eloquently to the sound business wisdom of building for the future upon the bedrock of faithful service and fair dealing.

Repair Work That Is Worth While

AR too often railway repair work is done without thought of the morrow. On some roads, when a car comes in off the line for minor repairs, the one thought of the foreman is to get it patched up and out again. Naturally as little work as possible is done on it. When the time comes for general overhauling—and it comes all too soon—there may be a miscellaneous collection of patchwork jobs that have been accumulated over a period of months. To leave them in place, provided they are in working order, is the easiest procedure, so the car frequently goes out after the overhauling with a lot of nondescript elements. As this is repeated from year to year each car takes on its own individuality, and it is almost impossible to get uniformity of equipment on any line.

Contrast this with the procedure on one Middle Western property, where a new manager found a situation such as that just mentioned. He has taken as his criterion for repair work the question: Will we want this part a year from now? As a result, when an old car is being repaired, it is looked over to see if all the parts taken off should go back, or if they should be replaced by improved parts. As a result, it has been found possible to eliminate many detail parts that have become obsolete and use in their stead equipment that represents the latest development that is available. Of course, it is not possible by this mean's to make every old car thoroughly modern. It is, however, possible to prevent the usual kind of patchwork and to obtain a measure of standardization that makes for over-all economy.

A Traffic Institute in the Making

ORGANIZATION of the American Electric Railway Association committee on street traffic economics promises for the industry and for the country a broad study of the fundamentals of street design and use that may well be expected to have nation-wide consequences. This committee is undertaking a work which is second in importance to few subjects that confront American communities, and one which puts the electric railway industry in the position of taking leadership in the interest of sound community development.

There has been the suggestion that the country needs a traffic institute through which there may be brought together, in the interests of the nation, that small coterie of men who by training and experience have a real insight into the fundamentals of the traffic problem. Such men are in a position to work out for the guidance of the country the principles upon which economically sound solutions of present intolerable traffic conditions may be predicated.

The thought is a good one. Too many communities have jumped to conclusions in adopting traffic remedial measures, and few if any have any clearly defined policy of developing transit to meet their growing need. These problems depend for a sound solution on an understanding of many factors in city development that are fundamental and upon which there is little public knowledge or understanding. Even experts are not agreed on some of the basic principles upon which the development of a sound traffic plan depends.

In a few cities men have come into the limelight who have led the way toward distinct improvement in traffic conditions because they have had real knowledge of the problem on the one hand and public confidence on the other. In Chicago, these men were acting officials of the street railway company. But they approached the problem in the interest of the public and not the selfish interest of their own company. Only through that attitude were they able to obtain the public support necessary for application of their ideas. The results accomplished, from the standpoint of public welfare as well as that of the transportation companies, have more than demonstrated the ability of these men to guide the city's traffic policies.

That such men as these, together with a group of engineers and executives as well qualified as any men in the country to speak with authority on traffic matters, have been brought together in the committee on street traffic economics is in itself assurance that the electric

railway industry is taking definite leadership in the solution of the baffling problems that the traffic situation presents. At the first meeting of the committee it was clearly indicated that its work is to be a distinct public contribution, and that the interests of the particular industry with which these men are identified will be secondary rather than primary in their consideration. Thus it may come about that the country will find itself provided with a traffic institute while the public at large is still thinking of how such an institution may be brought about.

Reaping the Reward of Good Work

FEW more striking evidences of the value of good will are to be found than the prompt response by the newspapers and the public of Baltimore to the record made by the United Railways & Electric Company during the recent severe snow storm in that city. The editorials were unstinted in their praise of the work of the company. Quite properly their appearance must have been most gratifying to the management. Regarded legally, this intangible, evanescent thing, good will, is premised upon the existence of competition, so it is considered not to exist as value in public service cases. It has no place in the rate base, but it is a big thing, an important thing. Judge Hough was correct technically when in passing upon the Consolidated Gas case in New York, he said that the company was required by law to furnish gas to all demanding it within certain distances of the mains. But there is another side to the picture.

Merely to run cars, merely to furnish gas, merely to sell electricity, is not enough. Long before the electric railways were confronted with the present competitive era, many of them recognized this. The companies have invariably done best which have kept up their properties and done the thousand and one other little things that make for satisfactory service. Instance upon instance could be cited, but it is only necessary to refer to the records of the roads that have won the Coffin Award and of other competitors in this contest.

Ingratitude is a very human trait, but it seldom is the reward of the man who does his very best and convinces others that he is doing all that may be expected with the talents that have been delivered into his hands. And the holder of the talent is not the judge and jury in passing upon his own acts. The court by which his acts are judged is the court of public opinion. It is not a perfect court, to be sure, but its verdict is usually just. No business, not even a non-competitive business, is a law unto itself. Legally, the matter of good will may not be taken into account in non-competitive business, but good will is nevertheless the factor that very often spells success or failure for a property.

Real Maintenance Anticipates Repairs

PAINSTAKING thoroughness is the price that must be paid if success is to be attained in any continuing enterprise. Nowhere is this more true than in the work of keeping a property in condition for providing the class of service that is demanded by the public today. It is not enough to make repairs after a failure has occurred in service. The incipient failure must be discovered and the cause removed if the public is to be impressed with reliability and excellence in the company and its organization.

In this connection, attention has been directed in the past few years to the outstanding record made by the maintenance forces in New Orleans, where failures of service are so rare that they are a matter of comment. The way this has been accomplished was told at the recent meeting of the Electric Railway Association of Equipment Men, Southern Properties, by Gus C. Kraus. His paper, which is abstracted in this issue, carries no hint of a magical method. Rather, the excellence of the performance is the story of consistent, intelligent, hard work.

The practices followed in New Orleans, while they are of the best, are known to every master mechanic the country over. The secret, if there be any, lies in the inspection and overhauling of the equipment before it is due to fail from ordinary wear and tear. This requires a definite program which is developed after long experience and is definitely held to. No easier road to good service exists.

The Changing Status of the Employee

APPROXIMATELY 2,000 men and women, veteran workers of the Westinghouse Electric & Manufacturing Company, attended the fifteenth annual banquet of the company's veteran employees' association a few days ago. This occasion was not only the largest affair ever held by the organization, but the largest banquet ever held in Pittsburgh. More than that, it served to focus attention on the changing status of the employee where proper direction is given to his activities with the recognition of the responsibility of the employer under the economic conditions that exist today.

The procedure followed by the Westinghouse Company in its dealings with employees is only one of many that might be cited. Other electrical manufacturers, notably the General Electric Company, have followed a similar progressive procedure. In the public utility field, participation by company managements on behalf of their employees extends in addition to pensions, to insurance, profit-sharing, building and loan activities, industrial loans, preventive medicine, doctoring, nursing, supervisory efforts and the planuing and management of budgets.

While the theory still persists in some quarters that employers have no economic responsibility to old workers, it is much less pronounced than it was, even in business regarded as highly competitive. The idea of progressive managements now is to use men intelligently, particularly older men, by training them for work which they can do when they no longer are able to perform the exacting tasks which were theirs during their younger years. In this work especially have the utilities been in the forefront.

The case for the future was put succinctly by Secretary of Labor Davis at the Westinghouse Company banquet when he said that science has added years to the span of human life. Instead of becoming a liability at 50 or 60, the intelligent worker is all the more an asset to the concern that employs him. The veteran employee is always worthy of his hire—some hire. If that were not true, he never would have become a veteran in that particular service. Much still remains to be done in the realm of bettering employee relations, but in the progress so far made the great electrical manufacturing companies and the rank and file of the public utilities have played their part and played it well.

James H. McGraw Wins Bok Award

Publisher of Electric Railway Journal Gets 1927 Medal for Distinguished Personal Service Rendered American Commerce and Industry Through Raising the Standards of Advertising

AMES H. McGRAW, president of the McGraw-Hill Publishing Company, Inc., chairman of the McGraw-Shaw Company and chairman of the McGraw-Hill Book Company, was presented the Harvard Advertising Award for Distinguished Services to Advertising (in 1927), highest of ten awards established by Edward Bok, at a dinner held on Friday night, Feb. 17, under anspices of the Graduate School of Business Administration of Harvard University. The award takes the form of a gold medal given to the "individual or organization deemed by the jury of award to merit recognition for contemporary services to advertising." The medal bears the inscription: "To James H. McGraw - For distinguished personal service rendered American commerce and industry through raising the standards of advertising-1927."

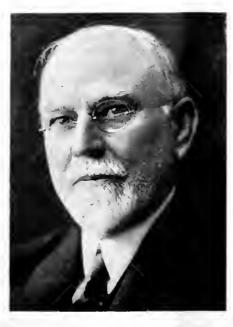
The Bok Awards are administered by the Graduate School of Business Administration of Harvard University. They are offered in the conviction that advertising, wisely utilized, is a great economic power to broaden markets and decrease the cost of distributing goods; but, if unscientifically employed, is wasteful to the community. The prizes are given for the best work in advertising within the terms of the several awards in accordance with the decisions of a jury of award appointed by the dean of the Harvard Business School.

The following quotations from the Harvard University announcement of the award indicate the reasons for bestowal of the medal upon Mr. McGraw.

1. James H. McGraw, president of the McGraw-Hill Publishing Company, Inc., was awarded the Gold Medal for Distinguished Contemporary Service to Advertising because of his life-long service in the upbuilding of higher standards in advertising in the business press of the country.

ing because of his her-long service in the inbuilding of higher standards in advertising in the business press of the country.

2. In making the award of the gold medal, which is the greatest honor in the series of Harvard Advertising Awards, Professor Sprague spoke of Mr. McGraw's pioneering work in the recognition of advertising's relation to marketing, and of his constructive services in the upbuilding of the highest advertising practices among the organized business press.



Iames H. McGraw

Professor O. M. W. Sprague is acting dean of the Graduate School of Business Administration of Harvard University. He presented the awards in the absence in Europe of Dean Wallace B. Donham.

In the field of business publishing, Mr. McGraw has been a leader in securing adoption of the code of ethics and business practice which today governs the editorial, advertising, and business activities of the organized business press. He has been a pioneer in the recognition of the relation of advertising to marketing. Studies of industry's buying habits and the effective form of marketing organization for industrial products have done much to clarify industry's appreciation of the particular requirements of industrial marketing, as contrasted with the development of sales to the private consumer. Mr. McGraw's constructive service to the upbuilding of American industry has long been recognized and was formally acknowledged publicly at a dinner of industrial leaders, held in New York a year ago. The committee which arranged for that dinner included Secretary Herbert Hoover; Thomas A. Edison; Owen D. Young; the late Guy E. Tripp; Simon .Guggenheim; John Hays Hammond; General William Barclay Parsons and Gerard Swope.

Mr. McGraw is president of the largest business publishing organization in the world, issuing fourteen engineering and industrial publications, twelve in New York, one in San Francisco, and one in London. The weekly and monthly journals over which he exercises executive control penetrate to every civilized country. They cover the fields of civil engineering and heavy engineering construction; the electrical, radio, electric railway and bus industries; the machine-using industries; the generation and application of power; the chemical industries, coal mining, and nonferrous metal mining. McGraw-Shaw publications serve industrial management and plant engineering through the broad sweep of industry as a whole.

In the electric railway and the electrical industries, Mr. McGraw has pioneered in development from the early days. His publications have heen responsible for the adoption of co-operative movements in many industries. They have insisted upon the elimination of unethical practices, wasteful of the public good.

Mr. McGraw was born in Panama, Chautauqua County, New York, on Dec. 17, 1860. He came into publishing from-the principalship of an upstate school. He is a member of many engineering, business and scientific organizations. Among these are the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, National Electric Light Association, American Electric Railway Association, the Illuminating Engineering Society, Harvard Business Historical Society. He is the third person to be honored with the medal for distinguished services to advertising. The two men previously honored are Ernest Elmo Calkins, president of Calkins & Holden, and O. C. Harn, managing director of the Audit Bureau of Circulation.

Advertising

And the Maintenance of Prosperity

By James H. McGraw

President The McGraw-Hill Publishing Company, Inc.

"The Part Which Advertising Plays in American Business Progress" was the subject of an address prepared by Mr. McGraw for delivery at a dinner held at the Faculty Club in Boston on Feb. 17, upon the occasion of the presentation to him of the 1927 Bok Award for distinguished service to advertising. His remarks dramatize the power and limitations of this modern business tool and voice the high ideals that must guide those who direct and use it

ADVERTISING has come to occupy an important position in the consciousness of the public and of business. Its potentiality—for good or for ill—in the distribution of both industrial and consumer goods, is recognized as tremendous. An abiding sense of responsibility to the public must be employed in directing this force. Assurance that advertising men recognize this responsibility is afforded by such organizations as The International Advertising Association and the Better Business Bureau. But a still more dramatic assurance has been called for, and this Mr. Bok has created in the Harvard Advertising Awards.

When, four years ago, these awards were announced, it was particularly gratifying to me that Mr. Bok, an outstanding editor and exponent of highest publishing standards, should have so clearly sensed the social responsibility involved in the creation, use and sale of advertising. At each stage of the business situation, advertising takes on new significance and new obligations. More and more, advertising becomes essential to the economical movement of goods, from industry to industry, from producer or merchant to consumer. More and more does advertising guide preference for commodities and services that, interwoven, form the very warp and woof of our civilization.

ADVERTISING AS A BUSINESS FORCE

At present the volume of trade is large. But competition is throttling; and profits, in some quarters, are declining. Some industries are despairing of customers. Has advertising, now so generally used, proved ineffective in maintaining full prosperity? Or have we as yet failed fully to appropriate the power of this great force? Lowered profits and idle capacity are not the concern of the stockholder alone. The public as a whole—employing and employed, as well as investor—suffers a set-back when profits are squeezed and wares go a-begging.

Primarily the function of advertising as a business force is to interpret or expand a personality, whether of a product or of a service or of an industry. Products and services vary greatly in personality or distinctiveness, and it has long been recognized that a distinctive product has a decided advantage and security in the market. Excessive competition, with the squeezing out of normal profits, results from a surplus of identical or alternate

products, or a surplus of products believed to be alternate.

In considering the broader use of advertising as well as its more effective application, it may be questioned whether any product, however staple it may appear at first sight, is without elements of distinction. A product is endowed with the qualities of its makers, and no organization is entirely devoid of personality. The very fact of survival in a competitive market is proof that there is distinctiveness in product or service. There are such individual factors as company reliability; assurance of progressive product improvement through intelligent engineering or painstaking research; ability to assist buyers by prompt deliveries; competence of representatives to advise on use and application of the product and on the condition of the market. There are a hundred respects in which firms differ from each other. All these affect the willingness of the buyer to take one manufacturer's product rather than another's, even though the products appear to be similar.

Advertising Puts the Battle on the Seller's Ground

The very planning of advertising results in a most searching examination of products since the distinctive elements must be determined. If, perchance, there be no market distinction, then, at the very least, advertising may guarantee a continuance of quality. The market position of certain brands of flour, bread, soap, cement, brass, industrial belting—the prosperity attending their makers—is eloquent testimony of advertising's effectiveness in the staple field.

True, advertising does not confer full immunity from price considerations and consequent narrow profits and halting markets, but it does shift the competition to bases of quality and use. It puts the battle on the seller's rather than the buyer's ground, but at the same time it proves a boon to the buyer because of insistence on quality. "Quality is remembered long after price is forgotten" is a slogan already accepted as a principle by industrial consumers. It suggests distinct social advantages to consumers at large.

Advertising cannot create qualities. Advertising cannot give market standing to a product where market value does not exist. It is sheer folly to assume that a product will take on compelling qualities if only they be claimed in advertising. Advertising can express, develop and amplify what is already present. It can stimulate the seed of product or service personality to growth and vigor. It cannot create the seed.

How often, through widespread advertising, do we learn that some worthy product, unknown because unheralded, is now to step out and claim its rightful place in the market. Advertising, presumably, is to supply the vitality, lacking for long slumbering years: advertising,

DVERTISING cannot create quali-

1 ties. Advertising cannot give market

standing to a product where market value

does not exist. It is sheer folly to assume

that a product will take on compelling

qualities if only they be claimed in adver-

tising. Advertising can express, develop

and amplify what is already present. It

can stimulate the seed of product or serv-

ice personality to growth and vigor. It

cannot create the seed.

presumably, is to create overnight the effective producing organization that the years should have been developing; advertising, presumably, is to create marketing courage where timidity has calmly reigned. Invariably the effort fails. The newcomer, flashing meteor-like across the sky, fades quickly and leaves but black night. And often,

all unjustly, the finger of accusation is pointed at advertising's failure.

Advertising is a challenge to soundness. It drags an institution into the limelight. It exposes it to examination and to criticism of its claims. Its defects are sure to be exposed. For businesses with productions that match the needs of the times, advertising is a beneficent instrument; for those with products that have no rightful claim to a market with the

public, advertising is either corrective or it is fatal. If advertising is to be an effective instrument of prosperity, soundness of marketing methods must be added to soundness of product or service. Distribution costs are being subpoenaed to appear before the court of public opinion. Too often advertising has had to bear the unjust odium of marketing's shortcomings. The logical markets may have been wrongly appraised. Distribution was attempted under conditions that made the cost prohibitive. Difference in buying habits, according to fields or industries, has been overlooked. Appeals to buyers have not been valid. Distribution channels have not been effectively organized. The sales force has been inadequate, ineffective or mishandled.

It is to their credit that many advertising men have been among the leaders in the adoption of modern marketing methods and that, in large number, they are competent counselors on marketing plans. We have a grave responsibility towards those to whom we offer ad-

vertising counsel. Effective advertising must be reared on two sturdy foundations; the first, a product or service which meets existent or unexpressed needs of the market; the second, a waste-free marketing plan for reaching responsible buyers.

In adapting advertising to its destined sphere of usefulness, we of the business press have endeavored to do our share. The consumer medium creates consumer demand and directs the consumer to the dealer. Our function is to move goods from industry to industry,

and from maker to distributor. To no small degree, industry's profits are measured by economies in those many inter-industry and inter-merchant movements which lie back of the final sale.

The very essence of the business press is an intimate relationship with and understanding of the industry or trade served. The significance of its editorial counsel finds reflection in the use of its advertising pages. Over inter-industry transactions, the industrial paper throws an effective net, tapping in for every industry on its supply channels, and affording the supplier a direct contact with his market. The buyer uses the industrial paper as a tool of operation, making it the channel through which he

> selects the materials and equipment for the efficient manufacture of his product.

> It is evident, therefore, that the industrial division of the business press has an important beneficial effect on the profit margin. Its reading pages are a text book of economy in manufacture; its advertising pages, a textbook of equipment for doing jobs at lower cost. Through the reading and the advertising pages, then, it conduces to the lowering of producers'

costs on consumers' products. Thus it tends to widen the profit margin. At the same time, through stimulating economies in production, it gives the public con-

tinually greater values.

In its trade division, the business press is friend and counselor of distributor and dealer. It is a powerful instrument in developing producer-distribution relationships that smooth the flow of goods to the public. It transmits evidences of sustained demand, introduces new products quickly, demonstrates the power of quality. Through the trade paper is established a community of interest among manufacturer, distributor and dealer. They become co-operating elements by which consumer wants are filled with desired merchandise of known quality, with prices reflecting speedy turnover.

The award of this medal, this high honor, to a business paper publisher indicates to me that the advertising world is aware of the importance of the business paper in

serving industry, trade and the public.

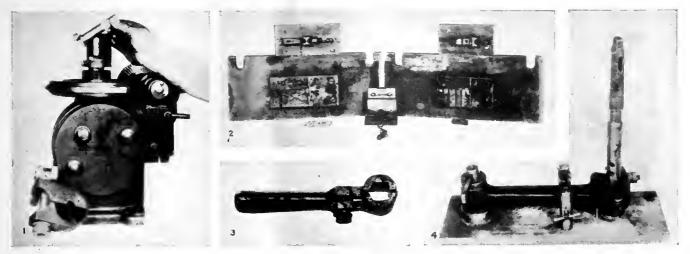
Advertising, proved an effective instrument in marketing specialties, is now entering the even larger arena where staples are battling before a price-obsessed public. It offers new weapons of quality and service in the struggle of business with meager profits. In this, advertising works for the public as well as for the advertiser. It helps to stabilize industry, and thus employment and dividends. It emphasizes quality and use, which, with price, are sounder criteria of value than price alone. It assures, through

price stabilization, the continued improvement of and the

development of products.

For myself and my colleagues in business paper advertising, I pledge you our best endeavors in a continuance of study, research and experiment, to correct misapplication of advertising, to make it a still more effective tool of business, and an agent in advancing the public welfare.

A PRODUCT is endowed with the qualities of its makers, and no organization is entirely devoid of personality. The very fact of survival in a competitive market is proof that there is distinctiveness in product or service. There are such individual factors as company reliability; assurance of progressive product improvement through intelligent engineering or painstaking research; ability to assist buyers by prompt deliveries; competence of representatives to advise on use and application of the product and on the condition of the market.



1. A special clamp combined with an ordinary indexing head is used in the milling of engineer's valve stems.

ing of engineer's valve stems.

2. The punch and die at the left produces

the larger half of display card clips. The punch and die in the center is used to bend the piece to its final right angle shape. The punch and die for producing the other

half of the clip is shown at the right.
3. Hinged type engineer's valve handle.
4. Jig used for boring rebabbitted air compressor connecting rods.

Jigs and Dies Have Many Uses

in Shops of Chicago Surface Lines

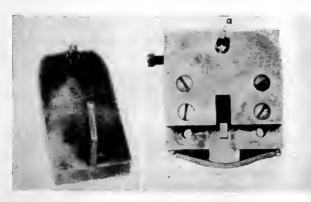
Small parts of various kinds are either partly or entirely made by punching processes in Chicago. Some of the work is automatic or semi-automatic and requires no finishing

Parts for various purposes about the Chicago Surface Lines is facilitated through the use of various jigs and dies. These insure uniformity and also accurate workmanship and hence save much time and trouble which would be necessary without them. A large number of these fixtures were described in an article in ELECTRIC RAILWAY JOURNAL for Dec. 20, 1924, page 1023. Some additional ones are given in the brief submitted for the 1927 Coffin Award. These are described below.

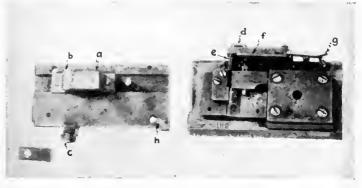
A form of die used for punching holes in small structural members which have been laid out with a center punch is arranged to locate the holes from the punch marks. When set up in the machine the end of the pointer marked a in the accompanying illustration cor-

responds exactly with the center line of the punch. When the work is moved so that the end of the pointer coincides with the center punch mark the hole to be made is located and the punch itself will descend in proper position. A wedge carried on an extension back of the punch enters the slot as the punch descends and forces the slide back so as to move the pointer out of the way while the hole is being made.

The distinctive feature of a semi-automatic punch and die used for forming contact fingers is its automatic ejector. Material of the proper size is fed continuously into the machine and the press is operated at top speed. As the punch descends the finger marked c in the accompanying illustration enters the opening d and forces the U-shaped ejector out of the way of the forming punch b.

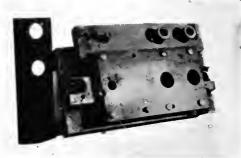


Die which locates holes from center punch marks. The pointer is designated as "a" in the accompanying illustration

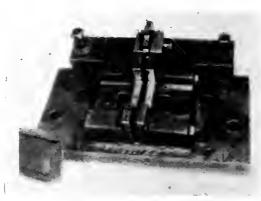


Semi-automatic punch and die for forming controller fingers.

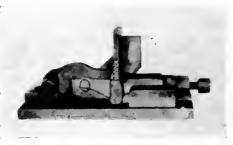
A feature is the automatic ejector



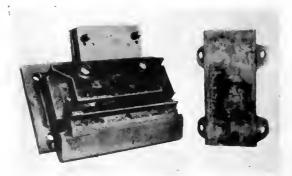
Multiple punch and die for punching large holes in channels



Punch and die for cutting off channel iron used in making truck pedestal wear plates



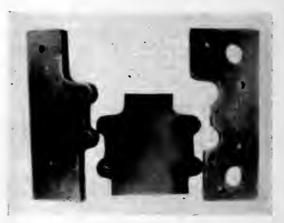
Fixture used for broaching brush-holders



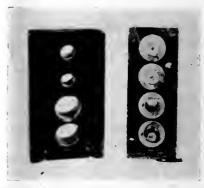
Jig for punching holes in wear plates



Punch die for making countersunk slotted holes in structural channel wear plates



Heavy cutting die for blanking out irregular shaped wearing plates



Double die for punching trolley wheel washers



This punch and die is used in the production of contact springs as shown in the lower left-hand corner

The ejecting spring e is compressed and the latch f drops into a notch, thus holding the ejector back in position. While this action is taking place the hook h slips below the secondary latch g. The piece in the meantime has been punched, formed and cut off and is lying in the bottom of the die. As the punch ascends the hook h trips in turn the secondary latch g and the latch f, releasing the ejector d, which under the action of the spring e snaps the completed piece out of the bottom of the die.

An excellent example of a die which substitutes punching for what would ordinarily be a drill press job is the one employed to make large holes in the channels that are used as wear plates on truck pedestals. In the illustration showing this multiple punch and die the block in the die supports the web of the channel so that it can be punched without distorting the flanges.

Another simple punch and die are used to make countersunk slotted holes in 4-in. structural channel wear plates for truck pedestals. These particular wear plates are held in place with countersunk head bolts with a lug at one side to prevent them from turning. As will be seen from the illustration the punch not only cuts and countersinks the hole but also forms the notch to take

the projecting lug on the bolt.

Another illustration shows a heavy cutting die for blanking out the irregular-shaped box wearing plates. It is necessary to make two cuts to complete the work, the piece being turned around after the cut on one side has been made. For cutting off the channel iron used in making truck pedestal wear plates a special punch and die are used. The die acts as a support for the web and the flange of the channel, thereby preventing distortion of the member which is cut. For punching the holes in the ears after the pieces are formed a special jig is used. This is of interest chiefly because of the complicated shape of the piece to be punched. It will be seen from the illustration that several sets of holes in the jig permit it to be used for punching wear plates for different sizes of journal boxes.

Å simple jig for holding brush-holders while the brush slide is being broached is shown in another illustration. The movable block, actuated by the hand screw, holds the brush-holder against the block. This block is pinned at one end, so that it can be raised out of the way, permitting insertion and removal of the brush-holder. The broach is shown in a position ready to be pushed

through by a press.

Trolley wheel washers are made efficiently by a double die. The material from which the washers are punched is purchased in rolls, two thicknesses of which are fed to the die at one time. The ribbon is fed through at such a rate that four washers are formed at each stroke of the punch. In the illustration the punches for the holes are shown at the top and those for blanking out the washers are at the bottom.

Another interesting punch and die shown are used to form a special type of contact spring. Five small punches produce the holes which support the spring and fasten on the contact tips. A large punch cuts the material out to the desired shape. Punching and forming are done at one stroke of the press, so that a complete spring is blanked out each time, the spring being given its final form by another punch and die in a following operation.

Display card clips are made in a special die. One part, shown at the left of the illustration, produces the large half of the clip, a complete unit being punched, shaped and cut off at each stroke of the punch. Another punch and die, shown at the center, bend the piece to its final

right-angle shape. The punch and die used to produce the other half of the clip are shown at the right. In both cases the material, furnished in the form of a ribbon, is fed to the die by hand, a stop allowing the proper amount to enter at each stroke of the press.

A simple jig facilitates the boring of rebabbitted air compressor connecting rods. The holding down strip is pinned at one end so that it can be swung out of the way, allowing the connecting rod to be placed in its proper position. The wristpin end of the connecting rod fits snugly over the plug and is held in place by a taper key. The wristpin end is supported by a plate and the crankpin end by pins. Side adjusting screws enable the operator to center the bore of the crankpin end with respect to the boring bar pilot hole in the base of the jig.

For milling engineer's valve stems a clamp combined with an ordinary indexing head is used. The clamping device consists of a split bushing which is tightened by a lever actuating a cam. Engineer's valve handles used on the system have special provision to compensate for wear of the stem and handle. The two main parts of the handle are hinged together at the stem end. The inner end of the smaller part is connected to the larger part by means of a screw and knurled adjusting nut. Tightening of this nut eliminates the backlash and the handle cannot be accidentally pulled off from the stem. As there is no movement between the handle and the stem in service there is no wear, and a saving in the bushing of handles results.

Berlin, N. H., Does Extensive Track Rehabilitation

5-in., 80-lb. T-rail laid on creosoted ties used with paving of concrete. Cost was paid from earnings

> By Harry W. Noyes Manager Berlin Street Railway, Berlin, N. H.

DURING the months of July and August, 1927, the Berlin Street Railway reconstructed 3,000 ft. of paved track in the city of Berlin, N. H. Although in these days of the automobile some railways are taking up their tracks and substituting buses, this company is taking up old rails and installing heavier rails, double bonded, with treated ties completely imbedded in concrete. Every dollar spent on this new construction was taken from money earned in the past seven years. It is interesting to note that this street railway has been able to pay dividends on all of its stock for the past six years.

In 1923, 1924 and 1925 this railway laid 1,750 ft. of new track with concrete paving and the past year's work has been a continuation of the same program. Most of the track to be replaced was installed in 1902, with 4-in., 60-lb. rail. The base and filler in some places were of sawdust and slabs, covered with about 4 ft. of stones and gravel. In the course of time this paved section gradually sank and became extremely costly to maintain.

Excavation work was done by two compressors operating four paving breakers. The crew consisted of two foremen and 40 men. Solid concrete had to be taken out in some places to a depth of 11 in., or 3 in. below the bottom of the city's 8-in. paving slab.

Special care was used to make the paving waterproof, particularly along the rail. After the excavation of every 200 ft. the trackmen laid and resurfaced the new track.



Track at Berlin, N. H., rebuilt with 5-in., 80-lb. T-rail and concrete paving

Standard A.S.C.E. 80-lb., 5-in. Carnegie open hearth T-rail, in 33-ft. lengths, with six-hole angle bars, was used. Spacing of drill holes was $2\frac{1}{2}$ in., 5 in. and 6 in. Track bolts $\frac{7}{8}$ x $\frac{4}{9}$ in. were used with U. S. Standard square nuts and $\frac{7}{8}$ x $\frac{5}{16}$ x $\frac{1}{4}$ -in. heavy positive type D lock washers.

Rails are supported on creosoted Southern yellow pine and kyanized Northern spruce ties. In a railway the most important ties are under the joints, switches and frogs. At these points we used at these places only kyanized Northern spruce ties, manufactured by the Brown Company of Berlin, N. H. At other places we used the creosoted ties. These ties were laid with 30-in. centers, while the joint ties were spaced with 24-in. centers. The ties were laid on 2 to 4 in. of sand and gravel.

The rails were double bonded at each joint, using O-B rail bonds, type AW-8, 7 in. long and of No. 00 size. These were welded on the ball of the rail. On the base of the rail, at each joint, we also used the O-B rail bond, type AW-7, 44 in. long. At about every 500 ft. we used cross bonds, made of old trolley wire.

Carey expansion joints were used, with dimensions of $\frac{1}{4}x9x7$ in. After pouring a 1:2:4 mixture of concrete, it was allowed to cure for seven days. Great care was taken to tamp the wet mixture of cement, sand and stone thoroughly under the rails. The city then laid kyrock, a bituminous form of oily concrete from the edge of the cement to the curb of the sidewalk. When thoroughly compressed and properly laid this becomes hard and makes a good street surface.

At two places in this reconstruction bridges were encountered. Water formerly ran under these bridges and

afterward they were filled in with various materials. Considerable sinking had occurred. At these locations a layer of concrete 8 in. deep was laid. On this old rails were placed covering an area of 8 ft. wide and 40 ft. long. Then the rails were covered with concrete. The ties were placed on this surface and covered with the regular paving, 11 in. between and 5 in. over the ties.

Special work had to be installed on one turnout. This consisted of two switch mates and two frogs. The two rigid mates were of manganese steel, iron bound, of 7-in. construction and having a tread clearance of 3 in. The two frogs were of hard center and were iron bound.

Since the completion of this reconstruction the Berlin Street Railway has received many compliments from its patrons.

Increase in Assets of Milwaukee Loan Association

MORTGAGE loans amounting to \$1,991,691 were made during 1927 by the Employees' Mutual Saving, Building and Loan Association, comprised of employees of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., according to the association's annual report. Assets on Dec. 31 are shown to be \$9,154,556, an increase of 14 per cent. Outstanding loans number 3,077, an increase of 279 for the year.

New Bus Garage for Worcester

FIFTY buses can be accommodated in a garage recently completed by the Worcester Consolidated Street Railway, Worcester, Mass. The cost was about \$120,000. The large floor space is free from obstruction and the roof is of the truss type. A large skylight provides daylight illumination. The garage is equipped with a large machine shop, repair pits and a battery-charging department.

A new carhouse has also been built at a cost of \$235,000. It is of modern design, being modeled after the Hooker St. carhouse in Springfield, Mass. There is space for 40 cars inside the house, and an outside storage yard provides for 200 additional cars. The carhouse has facilities for inspection and washing. It also provides rest rooms for employees, lockers, offices and a restaurant. The garage and the carhouse are adjacent, both standing on the Grove St. property of the company, which previously was used largely for outdoor storage.



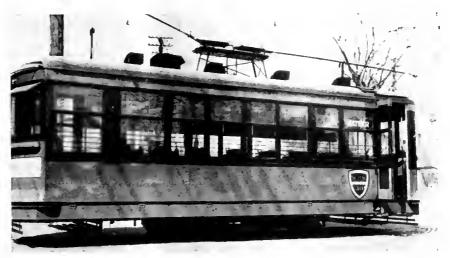
Interior of new bus garage

Making Old Cars Attractive

It is possible to do many things to improve the appearance of rolling stock so that it has greater rider appeal and earning power. Rubber insulation has reduced noise greatly

By Joseph E. Bodoh

Master Mechanic Wisconsin Public Service Corporation, Green Bay, Wis.



A gutter above the windows prevents rain from streaking the windows. Note the skirt which conceals the running gear and reduces noise

OT only can new cars be designed so as to attract the eye of the riding public but to a considerable extent the existing rolling stock can be improved so that it also has an appeal. Along this line the Wisconsin Public Service Corporation at Green Bay made the Civic Safety Week held there recently the occasion of special significance with the first showing of a new idea in street car development. One of the regular Birney city cars was turned over to the master mechanic some time ago with permission to do just about anything that he cared to with it to improve its riding qualities, its appearance and safety features, at a minimum of ex-

pense, of course. The result, as first offered to the public during Safety Week, has received unstinted praise.

A careful study of the demands of the public and of the necessities of the present street car era brought forward three outstanding needs in new car development. It was felt that the people wanted a better-looking vehicle than they had in the past been accustomed to riding in, as their private conveyances were finished both inside and out with the best available materials and in attractive colors. Another factor, noise, has brought street cars into public disrepute during the past few years. The clatter and rumble of the older cars has lost both cus-





At left, a near view of the skirt and the shield carrying the car number. At right, the skirt is in sections which can be raised for ready inspection beneath. Rubber blocks reduce noise of the running gear

tomers for the railway and friends among those who do not habitually ride. A third factor, safety, is of special interest at the present time because of the national study of traffic problems.

Improvements were first determined on to make the car more attractive as a conveyance. A new color scheme was developed to take the place of the time-honored green and yellow that had been standard in Green Bay for many years. This necessitated a study of colors and of their effectiveness in traffic. A very recent French color in one of the new finishes was finally selected for the body of the car. This color borders between an olive and a rich tan and will not show mud or dust. The window sash and casings are of a deep orange, a color

floor with a tan section down the center, between the seats. The illumination in the car has been doubled, adding both to the appearance of the car interior and to the exterior when seen at night from the outside.

In order to promote traffic safety the strip of white mentioned before was placed on both ends of the car. At night this strip and the entire front of the car below the windows are illuminated by use of floodlights concealed below the window line by means of a shield. The contrast between the white section and the tan body of the car is pronounced and is a very definite warning to motorists of the car's presence. It defines the width of the car more effectively than if the front were of any one color, due to the contrast. Safkar steel steps replaced the for-

mer wooden steps, with an apparent gain in the safety of people hoarding the car in wet or stormy weather.

Noise reduction came in for much consideration and the results furnish what is likely the greatest railway development as a result of this particular car. It is not yet possible to measure exactly the noise reduction that this car has achieved, but it is expected that accurate figures will be available before long. The rattle of the windows was entirely eliminated by the use of a small anti-rattling rubber roller developed for this purpose.



One of the large cars has been decorated like the Birney car. Note the white band on the dasher, the floodlighting and the motorman's visor

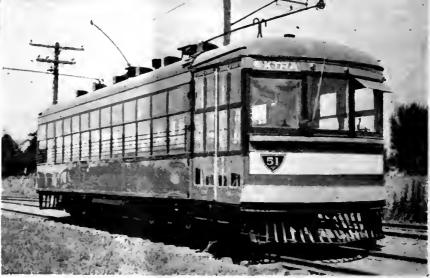
with exceptionally high visibility. The car was then striped in black, with extreme lines, giving it the appearance of extra length. The front of the car has been decorated with a 10-in, white stripe, as shown in the illustrations, adding to the neat appearance and acting also as a safety precaution. The roof of the car is black.

In order to eliminate somewhat the dirty appearance that a car has after it has been out in the rain for any length of time a gutter has been attached to the bottom of the letterboard just above the windows. Realizing

that an ordinary gutter would not hold the water when the car was in motion, a good deal of time was spent in designing one that would not spill water except in unusually heavy rains.

The car has been numbered in an unusual manner with an adaptation of the Byllesby shield, the Wisconsin Public Service Corporation being a member of the Byllesby Engineering & Management Corporation system. This shield just to the left of each door carries the car number and the initials of the local company. A small shield on the front of the car also gives the number.

The interior of the car has been decorated in light tan enamel with a white enamel ceiling and a dark green



The attractive color scheme adopted for the Birney car was used on one of the larger cars also. The body color borders between an olive and a rich tan while the window sash and casings are a deep orange

The source of what seems to be 85 per cent of the street car noise, that rising from the trucks, wheels and gears, was next given consideration. The wheels and gears have been lined on both sides of the web with eight rubber blocks, bolted through holes in the web. Rubber, as the best known noise absorbent, has been used extensively, following the trend of the bus industry. These rubber blocks reduce the shrill noises of the gears and of the wheels when brakes are applied or when the car is rounding a curve. Large blocks of rubber have been bolted to the journal boxes, journal box covers and gear cases. Long strips have been bolted to the main truck members. The idea has been to absorb or deaden the

noises as they travel along the metal of the car frame. The side springs are carried on fiber washers and the gear cases are cushioned on rubber pads. In every other place where rubber or fiber could be used to separate metal from metal it has been used. This insulation has eliminated all frictional noises caused by truck members moving against each other.

The car marks an inexpensive attempt to provide more attractive transportation and seems to have accomplished its aim in large measure. Certainly it has evinced many

favorable comments.

Harmony Line Tests Cruciform Rail Supports

SEVERAL forms of tieless track for interurban use have been tried in the last six years by the Pittsburgh, Harmony, Butler & New Castle Railway, under the supervision of Harry Etheridge, vice-president and general manager. A form has finally been developed which it is believed will meet the requirements of a permanent resilient track subject to the movement of cars weighing 90,000 lb. loaded, and traveling at 10 to 50 m.p.h.

The first stretch of tieless track, laid at Harmony Junction in 1921, was made up of plain concrete blocks composed of one part cement, two parts sand and four parts slag. The blocks were 16 in. wide, 30 in. long and 10 in. thick, with spaces of 10 in. between the supports to allow for jacking up the track. To obtain re-



Close-up view of inside leg of the rail support



The supports are staggered with respect to the two rails. Tie rods spaced every 16½ ft. hold the rails to gage

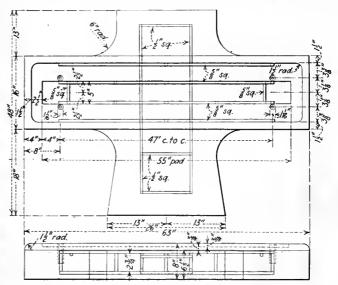
siliency, and to avoid grinding away of the concrete by rail movement, each block was recessed for a piece of wood 5 in. wide, 20 in. long and 1 in. thick. The blocks projected $\frac{1}{4}$ in. above the face of the concrete.

A year's experience showed that the wood was not resilient enough to give the desired elastic support for the rails, so a pad of the general consistency of hard rubber tires was designed. This pad was 5 in. wide, 20 in. long and $\frac{1}{2}$ in. thick and was made up of roofing-sheet material, laminated under pressure. Unfortunately,

there was not enough bond between these laminations to prevent them from squeezing out with the weight of passing rolling stock. The manufacturer of Carey "Elastite" track filler supplied a material for trial, but this, too, proved too soft. Pads of scrap leather, made up in vertical laminations tied together with end plates and a pair of through bolts, were supplied by shoe manufacturers and given a trial. This combination, however, was too hard for use.

The Carey company produced another combination and this seems to be a permanent cushion for the rail blocks. This cushion is made up with a very flexible "Elastite" pad measuring $55x5x\frac{1}{2}$ in., over which there is placed a harder "Elastite" composition $\frac{1}{2}$ in. thick. This combination has shown extrusion in only five out of twenty blocks and in these cases it has not been serious. The hallast gives both elasticity and permanence and should prove superior to either rubber or leather.

Despite their lack of reinforcement, the original concrete row of blocks gave much better service than might have been expected. Most of them are still free of serious fractures. However, it was realized that for permanence reinforced concrete was essential and in building a ten-block, 60-ft. stretch at Zeigler in October, 1926, the concrete was reinforced with ½-in. square and $\frac{5}{8}$ -in. square



Cruciform concrete rail support showing fish-tail form of stabilizing leg and location of reinforcing rods

rods, spaced as shown in the accompanying diagram. A mixture of one part cement, two parts sand and three parts slag was used in this construction. An inside stabilizing leg 22x24x7 in. was added to overcome any tendency toward rocking or teetering of the blocks. Since the car wheel pressure is greater near the gage line, rather than at the rail center, it was necessary to offset forces that would turn the block aslant.

This construction proved satisfactory, but observation suggested further improvements to keep all forces in equilibrium permanently. Accordingly, when a 25-block, 150-ft. stretch was put down in October, 1927, a counterweighting shoulder was added on the outer side of the rail. The inside stabilizing leg was also changed from a straight-sided to a fish-tail form to secure better anchorage in the center of the ballast. This is the design shown in the accompanying illustration. The cost of this type of construction is placed at about 25 per cent more than construction with untreated oak or chestnut ties which are good for a life of only eight years.

Analyzing Trolley Line Failures

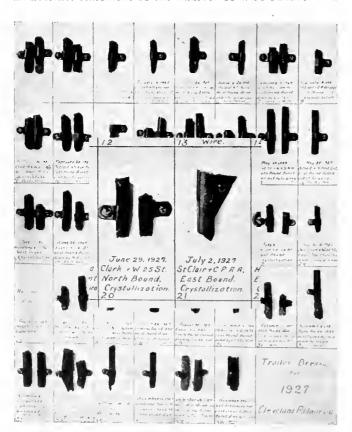
Systematic study of trolley wire breaks, with a visual record formed by the actual broken ends, has made possible a reduction in a year from 70 to 38 total breaks

By Angus G. Scott Assistant Superintendent of Overhead Lines Cleveland Railway

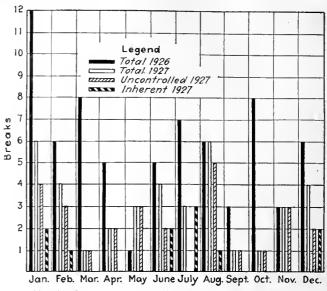
STUDY of trolley wire failures on the lines of the Cleveland Railway has been facilitated by clipping off and saving the ends of each wire break. The pieces, which are 1 to 2 in. long, are mounted on a board as shown in the accompanying picture and then are properly classified as to the cause of breakage. The ends where the failure occurred are always placed downward. Various public utilities the equipment of which was responsible for burndowns are designated by symbols. It is to be noted that the total breaks for the year 1927 numbered 38.

The saving of the ends serves several purposes. The vertical diameter of the wires at the various wire failures can be taken. This gives a check on the carrying out of work and causes for breaks. For instance, crystallization and the effect where it occurs on fittings can be shown to the linemen by a study of the actual wire ends. In this manner the correct classification of the cause of failure is made clear to them.

The samples are mounted on the employees' bulletin board together with the record of total failures and monthly totals of the breaks for the previous year. A visual demonstration is thus given to the men instead of an abstract statement of the number of wire failures and



Actual broken ends of trolley wires are mounted on a board by the Cleveland Railway to study causes of failure. These represent all the breaks for 1927



Cleveland trolley wire breaks in 1927 compared with those of 1926

their causes. This has inspired a united effort to eliminate preventable breaks.

A graph of the breaks from all causes, which is self-explanatory, was prepared as shown. The causes are further analyzed in the table. It is interesting to note that trolley wire failures for 1927 show a marked decrease from those of the year 1926. The total fell from 70 breaks in 1926 to 38 in 1927. The total breaks from all causes is now on an average one for every 1,000,000 carmiles traveled, or 0.097 break per single-track mile. The suggested A.E.R.A. measure of efficiency lies between 0.450 and 0.5 break per single-track mile.

Separating the failures into two divisions—namely, those under the control of the overhead department and those beyond—it is found that eleven failures fall under the overhead department supervision, as compared with 33 in 1926. Of these, four breaks were due to worn wire and seven to crystallization. Breaks due to worn wire were 8 per cent less than in 1926. The failures due to crystallization were all of such a nature that it would have been impossible to detect the weakness before occurrence of the failure. No wire that failed due to this cause measured less than 0.300 in, vertical diameter.

Failures beyond the control of the overhead department were 27, as compared with 37 in 1926. The highest single factor in producing trolley wire failures for the

ANALYSIS OF TROLLEY BREAKS IN 1927, CLEVELAN	D RAIL	WAY
Trolley Breaks from All Causes		
Uncontrolled:	1927	1926
Burnt down by foreign shovel. Burnt down by Cleveland Railway wires.	2	
Burnt down by Cleveland Railway wires	1	
Burnt down by foreign wires	13	
Burnt down by foreign cars	3	
Burnt down by Cleveland Railway cars	4	
Pulied out of splices by Cleveland Railway cars	1	
Building	1	
Fire	1	
Unknown	1	
•		
	27	37
Inherent:		
Worn wire	4	
Crystaluzation	7	
	- T	
	11	33 -
		70
Total breaks from all causes	38	70.
Location of Trolley Wire Breaks		
Due to worn wire:		
In section 0 Due to crystallization	on:	
At end of ear 0 At end of section insu	ator	4
Under ear 4 At end of crossing		I
Under structure 0 In curve		0 '
At end of splice 0 Bridge structure appro	oach	2
Total 4 Total		7

year was that of burndowns by foreign lines. These totaled thirteen, which was 34 per cent of the entire number of breaks on our lines.

Upon analysis of the various seasonal peaks it was found that they follow certain trends year after year. A high peak is reached in the summer months due to burndowns, and another comes in December and January.

A matter of interest is that between June 29 and July 17, 1927, four of the seven crystallization breaks occurred. This has been attributed to several causes, such as the weather and expansion of the wire. None of these reasons satisfactorily explains the phenomena.

The board for 1928 has been prepared with only 30 spaces for breaks. Unless unforeseen contingencies arise, such as sleet or wind storms, we expect to stay within this limit. Nevertheless there is plenty of room on the back.

Baking Enamel Used for Many Parts in Twin Cities

E NAMELING of many parts used on electric railway cars, such as window guards, car steps, stanchions, fare boxes and the like, is standard practice of the Twin City Rapid Transit Company. Baking enamels are used, and in almost every instance the parts are dipped, so that all brush work is eliminated. This results in a considerable saving of labor, according to Joseph Gabler, foreman of the paint shop.

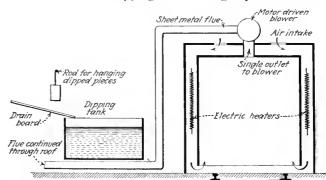
As the air temperatures in St. Paul, Minn., in which city the shop is located, are very low in winter some difficulty was experienced with the dipping process, as the enamel would become so stiff that it failed to drain satisfactorily. Accordingly a combination of dipping tank and oven was devised that provided sufficient heat to make the dipping process satisfactory.

The baking oven is 9 ft. wide by 12 ft. long and 7 ft. high. It was made by the Despatch Manufacturing Company of Minneapolis. It is similar to armature baking ovens except that it is somewhat larger. The walls are of heat-insulating material and are double. Air is admitted between the outer and the inner walls, as shown in the line drawing. It passes downward through resistance heaters, controlled by a thermostat, and enters the interior of the oven at the bottom. After passing over the pieces being baked the heated air is exhausted through a motor-driven blower on top of the oven. From here

One of the dipping tanks. An entire rear step assembly is suspended over the tank for draining

it passes through a rectangular sheet-metal flue, downward and beneath the dipping tank, which is placed close to the oven. After circulating beneath the tank the exhaust air is carried in a flue upward through the roof, so that the fumes from the evaporated solvents are kept out of the shop. This was found particularly necessary in the wintertime, since heating the shop is difficult at best.

Small pieces, such as fare boxes, are suspended from Shooks and dipped by hand. They are then hung to drain on a rod above a drainboard, so that the surplus enamel runs back into the dipping tank. Larger pieces, such as



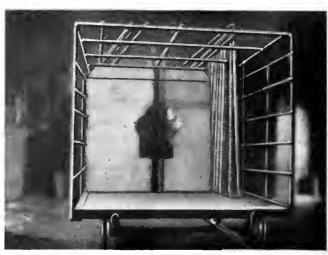
Section of dipping tank and baking oven, showing method of warming tank with waste heat from the oven

the rear step assembly shown in the illustration, are hung on a hand crane. They may be lowered into the tank, lifted for drainage and then swung out of the way while thus suspended.

After dipping and draining, all of the parts to be baked are placed on a truck which caries a framework for suspending the small pieces and supporting the large ones. This is shown in another illustration. When the truck is filled it is run through the opened doors of the oven, the doors are closed and the baking takes place.

Enameling is done in a variety of colors, as desired. The blacks are baked at a temperature of 450 to 500 deg F. for about one hour. Lighter colors cannot stand such a high temperature, being baked at 250 to 300 deg. F. for $2\frac{1}{2}$ hours. The parts are then completely dry and ready for use.

The enameling has been found a very satisfactory method of finishing miscellaneous parts. It is durable and readily cleaned. When pieces are dipped in any considerable quantity, as they are in this shop, there is a distinct economy over other finishes ordinarily used.



All pieces are placed on this truck for baking, which takes place in the oven at the rear

Second Monthly Prize Won by A. Taurman

A truck with centers for testing axles that may be bent also used in the straightening process was awarded the \$25 monthly prize for January in "Electric Railway Journal's" Maintenance Competition. A convenient attachment for pulling spikes submitted by Joseph Mercier receives honorable mention



Truck for testing axles, and for straightening them at the shops of the Birmingham Electric Company

axles by heating them, and then putting them in a lathe has been improved on by a method used in the shop of the Birmingham Electric Company, Birmingham, Ala. A truck with convenient centers for testing the axles, and on which they are straightened by means of a vertical hydraulic press, was described in the Maintenance Data Sheet Section of Electric Railway Jour-NAL for Jan. 21, 1928. This was awarded the monthly prize of \$25 by the judges. A description of the device was submitted by A. Taurman, superintendent of equipment, way and structures, for the Birmingham Electric Company. This is the second monthly prize that has been won by Mr. Taurman, as his article on the use of Alemite fittings for lubricating half - ball brake hangers was awarded the monthly prize in the Maintenance Contest for May, 1927.

Mr. Taurman is giving great attention to improved equipment and better maintenance methods for keeping the rolling stock on his progressive property in the best honorable mention by the judges. possible condition. He is active in

TRAIGHTENING of bent of Equipment Men, Southern Properties, and was chosen vicepresident at its recent meeting in New Orleans, Jan. 25-27, after having served as secretary. Biographical notes of Mr. Taurman's experience were published in the June 18, 1927, issue of ELECTRIC RAILWAY JOURNAL.

The truck described has a threefold function. First, it provides a convenient means for testing eccentricity. Second, it provides a vehicle for transporting axles about the shop, and third, the axle can be straightened cold without removing it from the truck. A material saving in time and labor has resulted from its use.

Tie plates or cramped quarters sometimes interfere with effective removal of spikes, and prevent the use of a claw bar. The adaptation of the common form of ice tongs in a device for attaching to the spike, and for providing for the insertion of a lever to remove the spikes, as used by the Montreal Tramways, Montreal, Canada, and as submitted by Joseph Mercier, general foreman track service division of that company, received It will be recalled that Mr. Mercier the Electric Railway Association won the second capital prize in

the Maintenance Contest, which was awarded at the Cleveland Convention last October. A short biography of Mr. Mercier was published in the Annual Convention Number of Electric Rail-WAY JOURNAL, dated Sept. 17, 1927.

TIME FOR SUBMITTING CONTEST ITEMS BECOMING SHORT

CCORDING to the rules of The competition, manuscripts to be eligible for one of the monthly prizes must be submitted before April 30, 1928. This leaves but $2\frac{1}{2}$ months remaining for those interested to get in their material. Many of those who have already submitted items in the contest have advised that they intend to submit additional items. A certain advantage will be gained by sending these in early, since space limitations prevent the publication of out a limited number in each group. It is evident that the articles published so far in the maintenance competition treat of only a few of those advanced practices which can be found in every maintenance department. In a visit to a moderate sized shop, the maintenance editor secured more than 50 items, all of a nature similar to those which are now being published in the competition.

The Maintenance Data Sheet Section in this issue contains another group of articles which were submitted in the competition. One of these will be awarded the \$25 monthly prize for February. Results of the contest each month are published in the next issue devoted to maintenance and construction, which is the third issue each month.

The prizes offered are \$25 for each monthly winner, to be selected from the articles published in the maintenance data sheet section. A minimum of \$5 will be paid for each article accepted for publication.

Any employee of an electric railway or bus subsidiary may compete. The subject may be any maintenance practice or device for electric railway or bus repairs. Articles should be 100 to 200 words long with one illustration, and in no event longer than 400 words with two illustrations. Manuscripts should be mailed to the editor of ELEC-TRIC RAILWAY JOURNAL, Tenth Avenue at 36th Street, New York City, on or before April 30, 1928.

Additional details were given in this paper for April 16, 1927, pages 700-701.

TRACK AND WAY DEPARTMENT-17

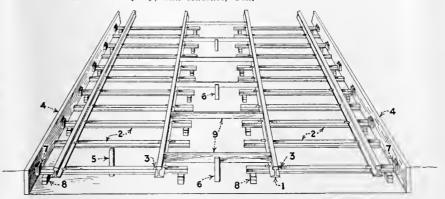
Conditioning Double Track for Concreting*

BY LOUIS T. BOTTO

Superintendent Maintenance of Way Department, San Autonio Public Service Company, San Antonio, Tex.

N THE work of preparing double-A track lines for concreting as carried out by the San Antonio Public Service Company, the tracks are left on the subgrade until a sufficient quantity of material has been hauled in and placed at suitable intervals to supply the mixer for at least a day's run. The hauling of materials then continues ahead of the work as it progresses.

Three crews of men are employed in conditioning the tracks for concreting. The first is the leveling crew which consists of a leveler and three men. Grade stakes are placed on 30-ft. centers in the center of the track not used by the work trains, and the actual leveling is carried out *Submitted in Electric Railway Journal Prize Contest.



- 1-60 lb. tee-rail
 2-Standard 6 ft. Carnegie steel tie, 30" on center
 3-Special 3/4"x2" bolts and clips
 4-2"x12" boards used as concrete form
 5-Grade stakes 30ft. apart. Red tops.
 Green tops indicate break in grade.
- 6-Line stakes 10-ft. apart, Plane tops. With tack
- 6-Line stakes 10-ft, apart, Mane tops, with tack on center line
 7-Wood blocks and wedges used to line track and hold it stationary while pouring concrete
 8-Bricks, blocks and shingles used to grade track
 9-2"x 4" braces to hold dummy gage

Track conditioned for concreting

in two operations. Tracks are first The process is then repeated and use of cypress shingles wedged on raised to approximate grade by the tracks are brought to a true top of the blocking placed previously. blocking under every other tie for grade as indicated by the grade On tangent tracks the two inside about 100 ft. ahead of the mixer, stakes. This is accomplished by the rails are made level with the grade

Electric Railway Journal Maintenance Data Sheet

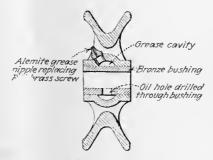
ROLLING STOCK-MISCELLANEOUS-22

Grease Lubrication for Trolley Wheels*

BY L. A. BRAMMER

Shop Superintendent Jamaica Public Service Company, Kingston, Jamaica, B. W. I.

OR a long time the maintenance Hof trolley wheels has been a large item of expense on cars of the Jamaica Public Service Company. The wheel bushing, which is of the usual type of bronze filled with graphite, is lubricated with oil through an oil hole closed by a small brass screw, $\frac{1}{4}$ in. in diameter. Oiling was carried out on cars every night after a run of about 120 carmiles. The service obtained did not exceed 1.500 miles before chattering of the bushing and screeching of the wheel would occur. Ordinarily one wheel would wear out about four bushings before scrapping. A messy condition of the rope and roof was sure to result.



Alemite grease fitting applied to trolley wheel

To improve this condition the screws in the trolley wheels were replaced with Alemite fittings for grease lubrication and a regular grease gun with No. 00 density grease was used. Since the installation of these fittings lubrication is done but once every two weeks and the life of bushings has increased so that but two per wheel are now used. Rope and roofs remain clean, and to add to the appearance the roofs have been painted with aluminum paint. One pound of grease is now used every two weeks where originally two quarts of oil were consumed each night. The accompanying illustration shows the method of installing the Alemite fittings.

TRACK AND WAY DEPARTMENT-17

Conditioning Double Track for Concreting-Continued

depressed a half inch.

A second crew sets the forms line at each center stake by means are reused in the work ahead. 10-ft. centers in the center of the has set for about two hours, the very great part of the work.

stakes and the two outside rails are dummy strip. Two of this crew key spacers and any wedges that stick up the tracks and secure them to exact out of the concrete are removed and

which are usually made of 2 in. x 12 of 2-in. x 4-in. spacers cut to exact The crews employed on this work in, boards in 16-ft, lengths. Two length and placed between the heads in San Antonio have had many years men work on each side of the tracks, of the two dummy rails to hold the of experience and have become explace the forms and make them exact gage, using blocks and wedges. pert in their respective lines. They secure for the liners who follow The other three men follow the first can condition for concreting 500 them. The top of the forms is usually two and complete the lining. One, by lineal feet of double track in eight made to conform to the grade of the sighting down the rail, directs the hours. A great advantage in lining other two in placing additional and surfacing tracks is obtained by The third crew, which lines the wedges, spacers or blocks to work placing the grade and line stakes, as tracks, is composed of five men. They the tracks between the stakes to ex- outlined, close together, thus perwork from a line of stakes placed on act alignment. After the concrete mitting the instrument man to do a

> Electric Railway Journal Maintenance Data Sheet ROLLING STOCK-MISCELLANEOUS-23

Convenient Receptacle for Switch Irons*

By R. T. CHILES

Master Mechanic Cumberland County Power & Light Company, Portland, Me.

ONSIDERABLE trouble was experienced on cars of the Cumberland County Power & Light Company in keeping switch irons in place, due to not having a regular position. When they were hung on a support the inside trim of the car was damaged by the swinging of the switch iron. To overcome this trouble the company now uses a pipe receptacle. This is made of 1½-in. pipe 20 in. long. One end is threaded and is screwed to a $1\frac{1}{2}$ -in.



Handy type of switch iron receptacle used by the Cumberland County Power & Light Company

floor flange. A round steel plate 1/8 in. thick of the same diameter and drilling as the floor flange is placed between the car floor and the flange and the receptacle is screwed in place. The steel plate prevents the switch iron from cutting holes in the car floor. Every car is equipped with two switch irons, each made of 3-in. round soft steel. 28 in. over all in length and with a D-shaped handle. Receptacles for the switch irons are provided at each end of the car.

TRACK AND WAY DEPARTMENT-18

Oil Heaters for Thawing Frozen Switches*

BY R. J. FENNELL

Assistant Road Master Way Department Toronto Transportation Commission, Toronto, Canada

PORTABLE type oil heaters are used during cold weather to overcome ice and frost when making paving repairs, to thaw out frozen switches and derails and to preheat rails for welding. Economy and flexibility have been gained through the use of a barrow type tank holder.

These heaters are of the high-pressure oil-burner type. They consist of a burner, a rubber hose and a 15-gal. fuel storage steel tank. Previous heaters of similar general type required two and frequently three men, depending on the class of work.

The barrow type tank holder has an adjustable arm that allows the burner to be set to any desired position. Meanwhile the operator manipulates the flame by movement of the barrow. The equipment is compact, which is of advantage for rapid clearing of track where work is done under traffic. Only two men are required for operation.



Barrow type tank holder for portable

*Submitted in Electric Railway Journal Prize Contest

Electric Railway Journal Maintenance Data Sheet
ROLLING STOCK—MISCELLANEOUS—24

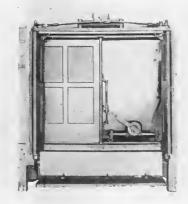
Test Equipment for Door Engines*

By G. R. FANNING

Foreman Pneumatic Section Hillcrest Shops, Toronto Transportation Commission, Toronto, Canada

POR testing door engines for leaks, speed and amount of cushioning, a platform with a heavy wooden frame, on which doors and a step are hung, is used in the shops of the Toronto Transportation Commission. The folding doors on this testing set are reduced in size to 4 ft. high x 4 ft. 9 in. wide over all, so that the engine can be handled easily. To compensate for this the panels of the doors are filled in with iron plates so that they have exactly the same weight as the doors used on cars in service.

Door engines, after being overhauled, are placed on a bed and are held there by two solid pins in the



Door engine test equipment

bedplate. The arms are left in position on the door adjusting screws and when the pin is placed through the gear shaft and arms, the door is immediately ready for test. While a door is being operated, leaks are found readily and are repaired. Also the speed of the doors and the amount of cushioning can be adjusted easily so that, when the engine is installed on the car, continuous service is assured and no time is lost through faulty operation.

The sliding doors are hung under the bedplate of the folding doors and weighted to correspond with doors in operation on cars, being reduced in size to 3 ft. 9 in. by 3 ft. Electric Railway Journal Maintenance Data Sheet
TRACK AND WAY DEPARTMENT—19

Connecting Rod for Electric Track Switches*

By P. F. GERHART Superintendent Line Department, Harrisburg Railways, Harrisburg, Pa.

DUE to increased weight of track switch tongues, difficulty has been experienced by the Harrisburg Railways from the usual type of connecting rod used with switches when electrically operated. To overcome the difficulty, rods are now made in the company's shops. A piece of 1-in. round soft steel is cut to the required length. By clamping it to the welding table the protruding end is shaped by being heated with a torch and bent to the proper angle with a piece of 1-in. pipe.

For forming the end which is to contain the eye, a piece of 1-in. flat

soft steel 3 in. square is notched out on one side by the acetylene torch. This is welded to the round rod. In the welding the rod is raised 1 in. above the welding table, the square piece resting on the table. This makes an offset of 1 in., which is just right for use on this property. The outside of the eye is dressed up with an acetylene torch and the hole for the connecting link is drilled. The rod is then threaded for 1-in. nuts. In some places the standard 1-in. nuts are too large on the outside, and to meet this condition 7-in. nuts are tapped out with 1-in. threads, and used.



The finished rod for the connecting links of electrically-operated switches is shown at the extreme right. The small square piece of iron on the left is welded to the bent arm of the rod shown next to the right. The finished rod, before machining, is shown in the third illustration

*Submitted in Electric Railway Journal Prize Contest.

 $Electric\ Railway\ Journal\ Maintenance\ Data\ Sheet$

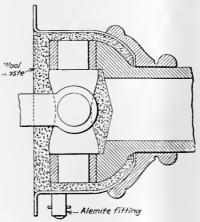
ROLLING STOCK—MISCELLANEOUS—25

Wool-Waste Packed Universal Joints*

BY CHARLIE HERMS

General Foreman San Diego Electric Railway, San Diego, Cal,

THE accompanying sketch shows A a wool waste packed universal joint as used by the San Diego Electric Railway. When packing this joint, a good grade of long-yarn wool waste is used and this is soaked not less than 72 hours in a good grade of transmission grease, preferably one having a fiber base. The universal joint should be opened enough so as to permit free insertion of the waste and this should be packed tightly. Strands of waste should be just as long as' possible as results will be better with long-yarn waste. After the joint is packed and assembled it should be filled with a good grade of universal joint grease by means of



Wool waste lubricated universal joint

forced lubrication. Heavy transmission grease has been found most satisfactory by the San Diego Electric Railway.

By use of waste packed universal joints the throwing of the grease is eliminated, which is common with most all makes of joints due to centrifugal force. The replacement of worn-out universal joints is reduced since more perfect lubrication is obtained. The time and labor of lubrication is considerably less with the wool waste packed joints since there is very little lubricant used and there is no danger of the joint running dry if inspected at reasonable intervals.

At Last Gear Quiet Gear — and at a reasonable cost

The "Tool Steel" QUIET Gear, will not ring—runs without noise. A new method of filling dove-tailed grooves with lead completely and permanently deadens sound.

We spent years experimenting with substances to kill the ring in solid gears. Pads of various nature bolted in the web, double web gears filled with non-resonant materials, grease pads and others were tried but were discarded, either because noise silencing effect was not permanent or method too costly for general application.

The "Tool Steel" QUIET Gear is absolutely without ring, has nothing bolted to it, is not abnormal or peculiar in shape or construction and costs but a very little more than the Standard "Tool Steel" Gear.

Specify "Tool Steel"
QUIET Gears on your
next order

The Tool Steel Gear & Pinion Co. CINCINNATI, OHIO

The Standard of Quality GEARS AND PINION



That welding wire test did pay

as told by a man who made one.

"Welding wire costs do not stop with the purchase of the wire. With the high prices we are paying expert welders now it does not take many bad pieces of wire to waste a lot of dollars in time.

Then you must consider the investment in the finished article being welded. A fraction of a per cent of spoiled work or even poor work, may more than equal the total cost of the welding wire used.

We have found the best welding wire we can buy is the cheapest we can use because it saves expensive time. That is why we standardize on Page-Armco since we made our tests."

You can test Page-Armco Welding Wire



in your own job. Your name and address will bring samples.

PAGE STEEL AND WIRE COMPANY

Bridgeport, Connecticut

District Offices: Chicago, New York, Pittsburgh, San Francisco. An Associato Company of the American Chain Company, Incorporated, Bridgeport, Conn.

PAGE-ARMCO

Welding Wire and Electrodes

ELECTRICAL INSULATION



and EMPIRE

Micanite and Super-Micanite Sheets, Commutator Segments, and Commutator Rings

Micanite Tubes and Washers

Linotape, Seamless or Sewn Bias (Yellow or Black Varnished Tapes)

Empire Oiled Cloths and Papers (Yellow or Black)

Compounds, Varnishes. Etc.

Send for catalog and helpful booklet on Commutator Insulation and Assembly

MICA INSULATOR COMPANY

Largest manufacturers in the world of mica insulation.

Established 1893.

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh Cincinnati
San Francisco Toronto Los Angeles Scattle

Works: Schenectady, New York. London, England

"American"



Light and Heavy SPRINGS

Advantageous location for prompt delivery of raw materials—Ample equipment of modern automatic machinery and appliances — Pyrometer equipped furnaces assuring accurate, uniform heat treatment and over 35 years' spring manufacturing experience constitute a service which means satisfaction.

May we estimate on your needs?

AMERICAN SPIRAL SPRING & MFG. CO.

Established 1887

ARSENAL STATION PITTSBURGH, PA., U. S. A. Electric Railway Journal Maintenance Data Sheet TRACK AND WAY DEPARTMENT-20

Machine for Grinding Heel Recess in Switch Castings*

By W. J. McCallum

Foreman Frog Shop Way Department, Toronto Transportation Commission, Toronto, Canada

CWITCH castings worn oversize at cal and horizontal feeds. By means The heel recess are rehabilitated of an annular guide, the grinder is by the way department of the To- capable of being swung through a ronto Transportation Commission, complete circle. It is held in posiwork is done at night.

grinder which is provided with vertimanner.

Toronto, Canada, which has de-tion by clamping the extension arm veloped the grinding machine shown into the recess left by the switch in the accompanying illustration, tongue. The arm is made reversible When the tongue and casting are for right- and left-hand castings. worn beyond allowable limits, the Car passes are permitted during the heel recess is built up first by weld-progress of the work by removing ing, using manganese rods, and then the grinder and dropping in a temis ground out to standard diameter porary tongue with a small heel. In by the grinding machine. All of this this way oversized recess castings are made standard and undersized The machine has a bracket to hold tongues are taken to the shop where and control a portable electric hand repairs are carried out in a similar



Equipment used for grinding the heel recess in switch castings

*Submitted in Electric Railway Journal Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK-ELECTRICAL-40

Automatic Test for Control Jumpers*

BY HARVEY L. BULLOCK

General Foreman of Electrical Equipment North Station, New York Central Railroad, White Plains, N. Y.

F OR testing electric car jumpers bell to call the attendant, the defectives other than steam, a machine when the test is completed. has been designed and built in the that jumpers used between units cylinder connected to a series of star minute.

that is necessary is to start the ma- in the jumpers used on the New York chine. If a conductor is defective, Central locomotives. the machine comes to a stop, cuts off the high-tension current and rings a of an operator several hours per day the high-tension current.

to comply with the I.C.C. rules tive wire being indicated on a dial. for inspecting and testing locomo- The machine stops automatically

A timing element is provided in electric shops at the White Plains, the equipment which energizes a north station of the New York Cen- magnet valve, which in turn allows tral Railroad. The rule provides compressed air to operate a small air carrying a potential of 600 volts or wheels, levers and cams. Connecover shall be tested by immersing tions are interlocked with the conthe cable portion in water and sub- tacts on the dial to allow exact jecting each conductor, one with the timing. The dial at the right as other, and with the water, to a differ- shown in the accompanying illustraence in potential of not less than tion moves every minute, and the dial 13 times the normal working voltage on the left moves every twenty minfor a period of not less than one utes. When this latter dial has made one complete revolution, the test is With the equipment provided, all complete, there being twenty wires

This device not only saves the time



Machine for testing jumpers used between electric locomotives and cars by the New York Central Railroad

but is also a safety measure on account of obviating the handling of

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

TRACK AND WAY DEPARTMENT-21

Grinding Out Rail Corrugations*

BY F. J. MARTIN

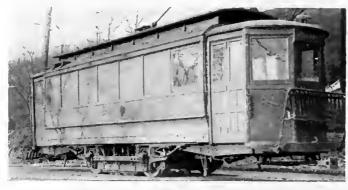
Superintendent of Maintenance Pittsburgh Railways, Pittsburgh, Pa.

cars were rebuilt to house the air

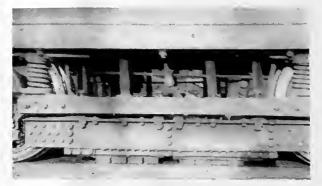
Obsolete single-truck are housed inside the car body.

cylinders and grinding block-adjust- pressure for the grinding blocks are boxes on each side of the car, each ing mechanism. A 25-ft, compressor controlled by modified Westinghouse box holding four bricks separated by supplies the air for the cylinders, M-20 brake valves. They can be standard spacers.

AIL corrugations are ground out which furnish the pressure to the operated by the motorman from with two shop-constructed cars grinding blocks. Two 16x60-in. air either end of the car. The grinding on the Pittsburgh Railways, Pitts- reservoirs and a 275-gal. water tank bricks used are of standard material $2\frac{1}{2}$ x4x10 in. They are held in a cast-The air cylinders that furnish the iron box 24x3 in. There are two



Exterior view of rail grinding car



Support for grinding blocks

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet ROLLING STOCK-ELECTRICAL-41

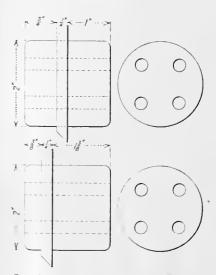
Bushing for Carrying Motor Leads Through Frame*

BY BENJAMIN H. HALL Shop Foreman West Penn Railways, McKeesport, Pa.

NSULATING bushings of the type the extension on the outside of the from ash and then dipped and baked The leads would work back and forth in insulating varnish to insure more and twist off the strands. The new-This provides good insulation and more rigid. It is held in place by a protection against water and mud.

different dimensions was used pre- the motor case by 2½-in. No. 14-24 viously. With the old-style bushing, round head machine screws.

f I illustrated are used by the West motor case was but 3 in. and the tape Penn Railways for carrying motor and canvas would not stay on. leads of Westinghouse No. 56 motors Splashing of water caused considerthrough the cast-steel motor shell, able trouble. The old bushing also All armatures and field leads which did not support the wire sufficiently connect to the main car cables pass to prevent vibration of the leads through this bushing. It is made while cars were rounding curves. perfect insulation. After the wires style bushing is made with a 3-in. are put through the bushing they extension outside of the motor case. are taped with a couple of layers of This additional amount is satisfacheavy tape and a layer of canvas. tory for taping so as to hold the leads brass collar that fits over a shoulder A similar type of bushing but of on the bushing and is fastened to



Insulating bushings for Westinghouse 56 motor. At top, new style of bushing; at bottom, old style which has given trouble

Adventures of

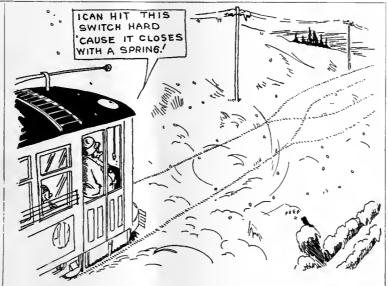
Old Man Trouble



on the

Hicksville Railway

Because switches are operated by electric power or a spring is not sufficient reason to assume that they are closed



SNOW, ice, sand and dirt prevent mechanically operated switches from fulfilling their duty during snow and rain storms. Time and repairs are saved by stopping the car before pulling across a switch point which cannot be seen. If a fast-moving car splits a switch, the brakes cannot be relied upon to stop the car before the motor leads and brake riggings are stripped.

ELECTRIC RAILWAY JOURNAL will be glad to furnish press proofs of this page for posting on bulletin boards and will supply electrotypes of this series at cost for use in company publications.



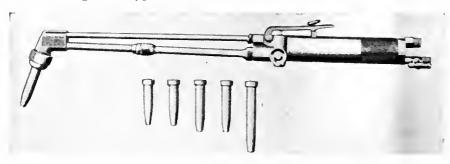
New Equipment Available

Combination Cutting and Welding Torch

CUTTING or welding is possible by interchange of tips in a new lightweight torch announced by the Alexander Milburn Company, Baltimore, Md. It is made for use with oxygen and acetylene, oxygen and hydrogen, or other gases. The new torch is designated Type RI. It is

under their supervision, with General Electric Company equipment, on a Willys-Knight chassis. One of these cabs is being operated in Philadelphia for experimental purposes.

The transmission and rear axle were removed from the Willys-Knight chassis and electric transmission was substituted. A generator, driven by the gasoline engine supplies current to the electric motor which is



Combination cutting and welding torch

extremely light for the range of work it performs, weighing 40 ounces. Only two gas tubes are used instead of three, as is common in other torches. The high-pressure cutting oxygen thumb button, which remains fixed in either open or closed position without sustained pressure, and the bronze forged torch head and valves having a tensile strength of 60,000 lb. per square inch are additional features.

Gas-Electric Cab

GAS-ELECTRIC drive for taxical claimed for the gas-electric capacity feature is the right-hand door back compartment which is compared by Mitten Management engineers, and constructed only from the 'criver's seat.

attached to the frame, and which drives the propeller shaft. There is no gear lever or clutch, the accelerator increasing or decreasing the speed in accordance with the pressure exerted by the foot. The only other foot lever is the brake pedal. The cab is placed in reverse by a small switch attached to the driver's seat.

Smoother and quicker acceleration, especially desirable in taxicabs which operate in heavy traffic, as well as lower maintenance cost and longer life, are outstanding advantages claimed for the gas-electric cab. A feature is the right-hand door to the back compartment which is controlled by the driver and which can be opened only from the criver's seat. This



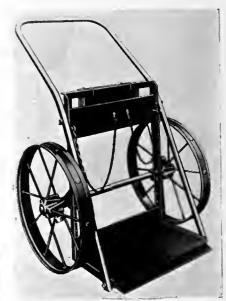
New type of gas-electric taxicab being tested in Philadelphia

precaution was taken as a safety measure for passengers who might possibly attempt to alight with the cab in motion or with an obstacle in the way. The interior of the cab is upholstered in mohair and has been designed to provide ample seating room for five passengers.

Large Wheel Truck for Oxy-Acetylene Equipment

ARGER wheel size was a primary consideration in the design of a two-wheel truck put on the market by the Oxweld Acetylene Company, New York, N. Y. Larger wheels make the truck much easier to handle. The illustration shows the new truck equipped with 24-in. steel wheels, having 3-in. $x \frac{3}{8}$ -in. grooved tires and a cast-iron hub. The hub is bored to fit the cold-rolled steel axle and a grease cup is provided. Lubrication is of particular importance where the truck may be hauled long distances at fairly high speed behind a motor truck.

Among other improvements, the handle is continuous and the upper portion is bent back about 8 in. so that the truck can be handled easily



Truck with 24-in. wheels

by an operator of small stature. The tool box is large and is provided with a cover and a holder for extra blowpipe tips.

Where 24-in. wheels are not required, 14-in. wheels may be used instead merely by changing the position of the axle to the lower set of holes which are already drilled in the frame. The same frame and axle can be used with either size wheels. No grease cups are necessary with the smaller wheels.

Small Blow Torch Outfit

FOR operations such as soldering and brazing where a low-flame temperature can be used to advantage, an inexpensive outfit has been developed by the Prest-O-Lite Company, Inc., New York, N. Y. It consists of a light blowpipe handle and a set of special tips to give flames suitable for a wide range of work. The outfit is most conveniently used with a small gas tank such as those standard for motorcycles or trucks and a 6-ft. length of hose. Small furnaces for heating lead, paraffin and the like can also be heated with the same outfit.

It is claimed that acetylene has advantages over other means of heating



Using the blow pipe for soldering

for this class of work, as it produces a high flame temperature and the flame is non-oxidizing and non-carbonizing. No preheating is required and in operation it is necessary only to turn on the gas, light the torch and the job is under way. Soldering may be done either with one of the tips or the blowpipe may be converted into a soldering iron by slipping the soldering copper over the end of the blow torch tip and tightening a single set screw.

The outfit is particularly convenient® for electric work on poles or underground in inaccessible places. Painters use it for burning off paint. New uses in the shop are being found constantly.

Dick Prescott Gets a Surprise

And a Promotion



N THE appointed morning, fol-Jowing Mr. Milburn's inspection of the newly painted car in the Consolidated Railway & Light Company's shop, Dick Prescott, young assistant superintendent, reported at the general manager's office. When Dick was ushered in, he

found Mr. Milburn in no hurry to get into the subject of their conference.

"How long have you been with the company, Dick?" suddenly asked Mr. Milburn.

"Just about four years."

"That's right, I remember now, you joined the company just a few weeks before I came on the property.

"Yes, sir, and I think the company has been making some real progress during that period."

"Tom Mullaney speaks very highly of you, Dick, and gives you credit

for much of the progress that has

been made in the shop.' "He's very considerate, Mr. Mil-burn, for after all Mr. Mullaney has backed up my work and has carried the responsibility for the success of any suggestions I may have made." "You're not afraid of responsibility

yourself, are you Dick?'

"No, sir, I don't think I am. Fortunately, I've had the co-operation of all the foremen in the shop. We thrash things out pretty thoroughly before making any important change in practice, and when we decide to go ahead, I'm pretty sure of my ground."

"Fine, Dick! That kills two birds with one stone; it wins you the cooperation of your foremen and at the same time enables you to check your own judgment with their experience. That's my idea of developing team work in an organization.'

"I believe, Mr. Milburn, that this business of ours requires a lot of team work all the way up and down

the line.

"Right again, Dick. I've noticed that you seem to have sensed the thrill that comes from this game of rendering transportation service to the public, and that you have succeeded in transmitting your

spirit to those around "Thank you, Mr. Milburn."

"Thank you, MIT. A...."
"That isn't all, Dick. I've got Tom Mulsome real news for you. laney is going to retire. He hasn't been very well lately and so he's going to move out to that farm of his. I have therefore decided to make you superintendent of equipment in full charge of the depart-ment, effective immediately. That ment, effective immediately. was Mullaney's suggestion as well as my own idea."

This momentous news came as a complete surprise to Dick. There flashed through his mind the memory of his keen disappointment at having to leave college and of his humiliation upon being forced by necessity to seek an humble job in the Consolidated shop. For a moment he was overwhelmed by his feelings and struggled valiantly to recover himself.

"Gee! Mr. Milburn," he finally managed to stammer. "I—I hardly know what to sav.'

"Don't say a thing, Dick. Your record speaks for itself. You have earned the promotion by your spirit and your work. I have great confidence in your ability to carry this increased responsibility with credit to yourself and the company.

The general manager chatted cordially for awhile, outlining some of his hopes for the property. He suggested that Dick take a few days to adjust himself to the new conditions before endeavoring to discuss the work of his department.

As Dick started back toward the shop he could scarcely believe that it was all true and that he was actually to be in charge of the equipment department. After he had boarded a car and settled down in his seat, his mind reverted again to his early days in the Consolidated shop. Thoughts crowded in upon him until he was hardly conscious of his surroundings. Thus deep in reverie, he suddenly realized that he had reached his destination.

"Gee!" thought Dick as he arose to alight; "I wonder what the gang will think about this when they get

the news.

Association Activities

Maintenance vs. Repairs*

By Gus C. Kraus Assistant to Superintendent of Rolling Stock and Shops, New Orleans Public Service, Inc.

SUCCESS attained with any program for keeping cars in serviceable condition depends almost entirely on the organization that is behind it. Our organization in New Orleans is divided into three departments—practical, engineering and statistical. The assistant to the superintendent is the head of the practical department, and is in charge of all shops and carhouses. He is responsible for all work done on the The equipment engineer is responsible for all engineering work. The chief clerk is responsible for the keeping of all mileage, material and cost data. These three heads report directly to the superintendent of rolling stock and shops.

The overhauling of all equipment is done at our Carrollton shops, where cars are received after completing 40,-000 car-miles of service, or on an average of once every twelve months. From mileage reports of the statistical department, cars are sent to this shop by orders from the office of the superintendent of rolling stock and shops.

overhauling consists removing motors, line breakers, circuit breakers and air compressors from the car; replacing them with tested units that have previously been placed in as near their new condition as possible. At the same time, trucks, brake rigging, air piping, door mechanism, controllers, car wiring and minor units (such as trolley poles, harps and wheels) are carefully checked and overhauled as required, so that they may safely give 40,000 more car-miles of service without the threat of an equipment failure.

All overhauling, with the exception of armatures, is done under the supervision of the shop foreman, but overhauled units must be tested by the shop engineer and have his o.k. before they may be placed on a car. This engineer also has charge of all armature work, since this work requires almost continuous electrical testing. Electrical tests, such as resistance measurements, high-potential tests, motor running-in and load tests, etc., are made by the engineer, or under his direction. A detailed outline of motor overhauling and testing procedure used in New Orleans appears at the end of this

We do not permit any "jumping" or

*Abstract of a paper presented at the meeting of the Electric Railway Association of Equipment Men, Southern Properties New Orleans, La., Jan. 25-27, 1928.

"cutting-out" of armature coils. It has been our experience that due to the localized heating which is set up, a cutout coil will cause flat spots on commutators, weak brush-holder springs, rapid brush wear, commutator flashing and undue destruction of coil insulation. Furthermore, the rating of the motor with jumped armature coils is

necessarily changed.

The overhauling and painting of car bodies is done at our Magazine shops. Cars are received there on an average of once every eighteen months, the work done depending entirely upon the condition of the car. For example, paint work may be either a "cut-in" job or the old paint may be burned off completely and the surface brought up new. The latter process requires about fourteen days. Cars have their paint burned off on an average of once every

In addition to overhauling and painting car bodies, the only other work done at the Magazine shops is maintenance work for the car stations. This consists of boring and fitting wheels, repairing doors and sash frames, and such forging and machine work as may be required between the 40,000-mile overhauls.

No Parts Are Made in Shops

Every effort has been made to eliminate manufacturing of any kind, since we feel that without a fully equipped laboratory and the services of a metallurgist we could not compete with those manufacturers who continually improve the quality of their products by experiment and research. Toward this end, we have closed our foundry and have noted a saving of between \$9,000 and \$10,000 per year in the cost of car material. Our present outlay for all castings, brasses, brakeshoes, etc., is 80.3 cents per 1,000 car-miles. This 80.3 cents per 1,000 car-miles. cost is based on the material used during the twelve-months period ending Oct. 31, 1927, which amounted to \$11,395,98. The total mileage during this same period was 14,188,380.

Reducing manufacturing activity in a railway shop saves valuable floor space and makes it available for maintenance work. For example, with our shops becoming more and more cramped for room, we contemplated the erection of new shops, at an estimated cost of \$1,500,000. The yearly fixed charges, including interest, depreciation, taxes, etc., which amount to 15 per cent of the above, sum, would

total \$225,000. This is within \$60,000 of the total maintenance cost on our cars. Now, at a cost of only \$20,000 we have changed over our present shops into better-arranged, betterlighted and better-ventilated shops that afford us sufficient room for our present needs after manufacturing work had been eliminated. We have provided a complete equipment of modern tools and the proposed new shops have been placed in the 1932 budget.

The amount of work done at the car. station in New Orleans has been reduced to a minimum. For example, in case of a motor failure, the motor is not removed at the station. Instead, the car is sent to the overhauling shop for an exchange of motor equipment. In this way the car can be completely checked to study the cause of the failure and prevent recurrence. The principal work at the car stations consists of making a regular 1,000-mile car inspection. Brakeshoes and wheels are changed as required, and all stations are provided with wheel grinders for grinding both new and old wheels.

It is the aim of our organization to standardize equipment to the greatest extent possible. Changes in standardization can be made only by an order of the superintendent, which is issued after an agreement has been reached hy department heads. A continuous check is being made of material that is out of date and may be obsolete. Old tools are scrapped when it can be shown that new equipment can do the work better, and at the same time earn the interest on the necessary invest-ment. New tools and equipment are being devised continually to facilitate overhauling work. Experimental material is placed on test and records are carefully kept to find how serviceable this material proves to be.

Department head meetings are held once a week in the superintendent's office, at which routine matters are handled. A meeting of department heads, station and shop foremen and engineers is held once a month. At this meeting the organization is furnished with detailed costs for each

station and shop.

In order to provide for the training of its men along lines which will be helpful to them in their work, the company has created an educational department, which conducts night classes in practical electricity, shop arithmetic and accounting. In the practical electricity class a particular effort is made to tie in theory with actual street railway operation.

Our practice is based on the principle that proper overhaul of cars at definite periods reduces maintenance costs to a minimum. This reduction in costs

is secured by the elimination of repairs between overhauls. At the same time the value of having cars in such condition that they will operate without a failure is worth more than the money saved through the elimination of these failures, since it secures the good will of the public.

METHOD OF OVERHAULING AND TESTING RAILWAY MOTORS

Railway motors are overhauled on a 40,000-mile basis. This overhauling is done at the Carrollton shops, under the personal supervision of the shop foreman and the engineer in charge of tests.

After 40,000 miles of service each car is sent to the Carrollton shops for overhaul. No motors are removed from cars at any time at any of the five carhouses. When the car is received at the shops the trucks are run out from under the car body, the motors removed from the trucks and the armature is removed from each motor.

In regard to the armatures, the term "dipped and baked" refers only to armatures out of overhauled motors. The armatures out of motors which fail in service are known as "rewound"

armatures.

If dipping and baking is all that is required for an armature, the procedure is as follows:

1. A "bar-to-bar" test is given to deternine if there are any loose connections, open circuited coils, or short circuited bars.

2. A high-potential test of 1,300 volts (at a frequency of 60 cycles) is made for one minute to determine if there are any grounded bars or coils.

3. Core and end bands are removed. 4. Dressings on both ends of the arma-

- ture are removed.
- 5. All low coils have fillers placed on top of them in order to get pressure on top of the coil when the armature is rebanded.

6. Core bands are replaced.7. The armature is preheated at least four hours at an oven temperature between 220-225 deg. F.

8. The armature is dipped, remaining in the dipping varnish a sufficient time to allow the varnish to fill all crevices so that air bubbles cease rising to the surface of the varnish. Specific gravity of the varnish is maintained between 0.835 and 0.845.

9. The armature is returned to the baking oven and remains there for 36 hours. The oven temperature is maintained be-

tween 200-225 deg. F.

10. The armature is redressed.

11. End bands are replaced.
12. The commutator is turned, taking the lightest possible cut across its face, and then polished with No. 00 sand paper.

13. The commutator is slotted, if necessary.

14. A second bar-to-bar test is given the

armature to check up, as in item 1. 15. A second high-potential test of 1,300 volts for one minute is given the armature.

16. Armature bearings are properly fitted

17. The armature is returned to the motor assembly floor to be replaced in an overhauled frame.

Rewound armatures are handled as follows:

1. Armatures are stripped of old coils,

core slots are cleaned and commutator necks are prepared for new coils.

The armature is rewound.

3. The armature is preheated in oven at least fifteen hours at a temperature ranging between 220-225 deg. F.

4. Temporary bands are placed on arma-

5. The armature is dipped in the man-

ner previously described. The armature is returned to the oven

and baked for 48 hours at a temperature ranging between 220-225 deg. F.

7. Temporary bands are removed from the armature, fillers are placed on top of low coils, the armature is redressed and then banded.

8. The commutator is turned up.

9. The commutator is slotted, if necessarv.

COMING MEETINGS

Electric Railway and Allied Associations

March 2 - Metropolitan Section. American Electric Railway Associa-tion, Engineering Societies Building, New York, N. Y.

March 13-15-Oklahoma Utilities Association, annual convention, Tulsa, Okla.

March 14-15 - Illinois Electric Railway Association, Springfield, Ill.

March 21-22 - Central Electric Traffic Association, Seelbach Hotel, Louisville, Ky.

March 23-Maryland Utilities Association, annual meeting, Emerson Hotel, Baltimore, Md.

March 30-Executive Committee American Electric Railway Association, 292 Madison Avenue, New York, N. Y.

May 2-5-Southwestern Public Service Association, Dallas, Texas.

May 6-12-Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

June 6-8-Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27 - American Railway Association, Div. 5-Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22 - American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29-Central Electric Railway Association, Cedar Point, Ohio. July 8-12-Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27-Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

10. A bar-to-bar test is made.

11. A high-potential test of 1,800 volts for one minute is given the armature.

12. Armature bearings are properly fitted to the shaft.

13. The armature is returned to the motor assembly floor to be replaced in an overhauled frame.

After an armature is removed from the motor frame the latter is thoroughly cleaned of all dirt or other foreign material. The fields are then tested as follows: (1) A "hammer" test is made to determine if the insulation is apparently in good physical condition, and if any of the coils are loose in the shell; (2) the resistance of the field coils is measured to see if it checks with the standard; (3) a high-potential test of 1,750 volts for one minute is given to determine if the coils show sufficient insulation strength: (4) polarity of any new fields which may be used is checked.

The following general work is done on motor shells: (1) The interior of the motor shell is sprayed with airdrying insulating varnish; (2) the motor leads are carefully examined and defective leads are replaced. All motor leads are then treated with a flexible insulating paint; (3) brush-holders are removed, put in first-class condition and replaced; (4) armature bearings are pressed into end housings.

After complete overhauling, the motor armature and frame are reassembled. The resistance of the motor armature is then secured, and the brush pressure checked. A running-in bearing test is then given the assembled motor by operating the motor at no load for at least fifteen minutes to see if any hot bearings develop.

The load test is the last test given a motor before it is replaced under the car. This load test has only been given recently, and is used on only a certain proportion of the overhauled motors. The present load test practice is to operate the motor under 150 per cent of its hourly rating for 7½ minutes in each direction of rotation.

New Officers for Wisconsin Motor Association

N EW officers were elected at the annual meeting of the Wisconsin Motor Coach Association held in Milwaukee on Jan. 20. These will hold office during the present year.
President, H. G. Monger, Milwaukee

Electric Railway & Light Company, Milwaukee; vice-president, F. L. Neilson, La Crosse & Southeastern Transportation Company, La Crosse; treas-urer, M. H. Frank, Wisconsin Power & Light Company, Fond du Lac.

Executive committee: Above officers and A. M. Schrum, Gray Transportation Company, Milwaukee; W. J. Kay, Northland Transportation Company, Minneapolis; B. W. Arnold, Chicago, North Shore & Milwaukee Railroad, Milwaukee; and N. C. Rasmussen, Wisconsin Valley Electric Company, Wausau.

Illinois Utilities Announce Joint Meeting

ON MARCH 14 and 15, the Illinois Electric Railways Association will hold a joint meeting with the Illinois State Electric Association and the Illinois Gas Association in Springfield, Ill. The program will be announced later.

Southwestern Transportation Men Meet

PUBLIC relations, traffic regulation, traffic congestion, de luxe equipment as a means of increasing rides, and the increase of car speed as a means of obtaining increased passengers, were the principal subjects discussed at a meeting of the transportation and public relations division, railway section, Southwestern Public Service Association, at the meeting held in Fort Worth, Tex., early this month. The meeting was conducted by L. E. Thorn, chairman of the transportation division, and A. B. Paterson, chairman of the railway section, together with Secretary E. N. Willis of the association. The attendance was good. Companies from San Antonio, Fort Worth, Dallas, Houston, Waco, Shreveport and New Orleans were represented.

The next meeting of the association will be held in Dallas, Tex., May 2-5.

Publicity Representative Proposed for C.E.R.A.

EMPLOYMENT of a joint representative for the purpose of delivering addresses before the various clubs and civic organizations, chambers of commerce, etc., in the territory served by the Central Electric Railway Association, was proposed by the publicity committee at the Cincinnati meeting. It was also proposed that such representative deliver similar talks in territories outside the immediate association territory, such as the Southern states to which new joint through-rates have been established.

Secretary L. E. Earlywine has addressed a circular letter to the members of the C.E.R.A. requesting their views on the desirability of the plan and whether they will subscribe to the expense of employing such a representative.

New Central Association Groups Proposed

MEMBERS of the Central Electric Railway Association have been sent a circular letter by President W. S. Rodger relative to the proposal made at the annual meeting held in Cincinnati to the effect that two new associations be formed. These, which would be similar to the Traffic Association and the Master Mechanics Association, would handle the work of the power distribution and track and roadway committees, which were authorized last year following the summer meeting.

The executive committee, to which the matter was referred for disposal, decided to solicit the views of the member companies regarding the advisability of organizing these two subsidiary associations. It was the feeling of the members of the executive committee that the same necessity does not prevail for associa-

tions to handle power and roadway questions that exist in connection with matters being handled by the present subsidiary associations, as neither track nor overhead power equipment is interchangeable between the railways. The executive committee is asking members to give their views on the subject.

American Association News

Standing Committee on Power Assembles

SPECIAL committee chairmen of the power division met at Cincinnati on Jan. 25, to report the work of their respective committees. Reports were made for all committees except numbers 3 and 13.

D. L. Smith, chairman special committee No. 5, proposed a division of the catenary specifications into light and heavy construction, and further, a segregation of materials for direct suspension, light catenary and heavy catenary construction, as a basis for this year's work of his committee. H. S. Murphy reported for committee No. 6 that the main line mileage will be separated this year from the yard and siding mileage in the tabulation of data on trolley wire wear. Also, that statistics will be prepared on a basis of 100,000 or 1.000,000 car-miles.

The preliminary report of committee No. 2 was read by H. W. Codding, on the subject of mercury arc rectifiers. All sections of the report except one were approved by the standing committee. John Leisenring reported that committee No. 11 was uncertain of the purpose of its assignment. A discussion of overhead versus underground distribution cables followed. It was generally agreed that for the purpose of comparison the committee should undertake to obtain data on initial costs of installation including fixed charges, maintenance costs and maintenance problems; also, the reliability and length of life of the two types of construction.

J. W. Allen, reporting for committee No. 1, stated that eighteen of the 30 sections of the Manual to be checked. had been reviewed and that few changes had been made. J. F. Neild submitted a statement of the activities of committee No. 8 and a drawing showing a proposed series of standard reels. W. J. Quinn reported for committee No. 7 that there had been no recent activities of the American committee on inductive coordination. He stated also that sufficient information on radio interference was available to warrant its assemblage in one report.

Manufacturers' representatives, according to C. E. Bennett of committee No. 4, are preparing a preliminary report outlining the advantages and disadvantages of the segregation of control apparatus and power apparatus. Mr. Bennett reported also for committee No. 10 and stated that various schemes for protecting both line and cars have been

discussed. The committee decided that it was preferable to ground the arresters to the rail rather than to install separate ground rods; and also, that the committee was not in favor of connecting rails and ground rods together. A general discussion developed with differences of opinion among the members present as to the proper method of grounding lightning arresters.

Committee No. 9, represented by A. J. Klatte, was requested to compare the conduit specifications in the Manual with those of the American Railway Association. It was also suggested that manufacturer members be asked to offer their suggestions as to desirable revisions. H. S. Murphy reported that his committee, No. 12, was gathering data on the use of non-ferrous materials for overhead construction on electrified railroads.

H. E. Bachman was appointed the Association's representative on technical committees 5 and 10 of the A.E.S.C. sectional committee on insulated wires and cable, to replace M. B. Rosevear, who resigned.

Those present at the meeting were W. E. Bryan, chairman; C. E. Bennett, C. A. Butcher, A. J. Klatte, A. Schlessinger, L. W. Birch, John Leisenring, J. F. Neild, W. J. Quinn, D. L. Smith, H. W. Codding, H. S. Murphy, C. S. Anderson, representing W. H. Bassett; J. W. Allen, and G. C. Hecker. H. L. Swift, Cincinnati Street Railway and J. C. Bailey, Columbia Engineering & Management Corporation were guests.

A.E.R.A. Joins in Better Copy Contest

THREE great national utility associations have now joined the Public Utilities Advertising Association in conducting the Better Copy Contest. The entry of the American Electric Railway Association followed the entry of the National Electric Light Association and the American Gas Association.

The electric railway group will act jointly with the Advertising Association in the competition which covers the electric railway and bus transportation fields. The three awards for the best public utility advertisement in this group will be presented under the auspices of the A.E.R.A. in conjunction with a joint committee of judges representing both sides. The contest in this division is open to all public utility operating companies providing electric railway or bus transportation service.

News of the Industry

Prospects Dim for Legislation

Committees entrusted with shaping future policy of state toward Boston Elevated agree to disagree

IT IS beginning to look on Beacon Hill as if the Massachusetts Legislature again would get into such a hopeless tangle over the Boston Elevated situation that it will be unable to extricate itself during the pending session. Its two committees, the metropolitan affairs and the street railway committees, which are handling the matter, are torn by internal dissentions over developments. The vote to reject a motion to invite the Boston Elevated directors to appear and offer some plan for the future in the interest of the stockholders is regarded as a blunder. They have voted to hear counsel Frederick E. Snow, in executive session instead. Some of the minority members of the committees are so bitter over this move that they declare they will bolt the executive session if Mr. Snow appears to discuss the Elevated behind closed

THE VOICE OF THE STOCKHOLDER SHOULD BE HEARD

The move to invite the directors was made by Representative Eliot Wadsworth, who is opposed to the Harriman plan for the extension of public control. He argues that thus far Elevated stockholders have declined to accept plans put forth by the Legislature. Since it has been reported to the committees that the Elevated directors will advise the stockholders to reject the Harriman plan now pending, Mr. Wadsworth says the time has arrived for a reversal of that policy. Stockholders should be permitted to advance plans to which the Legislature may say "yes" or "no." The trend of the discussion mostly

concerns the return of the preperty to the owners, and the extreme oppositepurchase by the Commonwealth and public ownership. Prof. Philip Cabot of Harvard University, advocated return of the property to the owners. James F. Jackson, former chairman of the Elevated Board of Public Trustees, recommended adherence in the main to the Harriman plan for extending public control for fifteen years. Frank A. Goodwin, registrar of motor vehicles, is urging state ownership and Representative Martin Hays would turn the property back to the stockholders. Public sentiment is swayed and changing. Hardly two leaders who appear in public seem to think alike on the subject today. The most likely eventuality is that the lawmakers will not pass any legislation favored by Governor Fuller.

A line of attack is being laid intended to show that so many legislators own Boston Elevated stock in their own

rights, or are related to people who own such stock, that many of them would be disqualified from voting on any Boston Elevated legislation this year. It is not understood that the law forbids voting under such circumstances, but there are rules and precedents to cite against it.

Joseph B. Eastman of the Interstate

Commerce Commission has agreed to address the committees on Feb. 23 on the situation.

Safety Record in Kansas City

In all 437 employees of the Kansas City Public Service Company, Kansas City, Mo., finished the year 1927 with clear accident records. The company is now driving for a similar record for the current year. Names and individual records were published in the February issue of the Railwayan, the official paper of the company.

Nine-Cent Fare in Baltimore

Service supplied by United Railways declared indispensable. Many improvements to be effected. Commission denounces park tax. Reorganization of financial structure desirable

AN INCREASE in fare from 8 cents cash or two tokens for 15 cents to 9 cents cash or three tokens for 25 cents has been granted the United Railways & Electric Company, Baltimore, by the Maryland Public Service Commission. At the same time the children's fare rate was increased from 4 cents to 5 cents. No change was made in school commutation or other rates. By the same order the company is to extend the first farc zone on the Halethorpe line to the terminus of the line, making one fare to and from that place instead of two. The change in fare rates became effective at midnight Feb. 12. Whether the rate will be accepted by the United has not been determined and will not be decided upon until officials hold a series of conferences with their legal representatives. The company's application was for a flat 10cent rate. In handing down the decision the Public Service Commission said officially that with the increased rate it would expect the company to improve its service forthwith, to decrease the headway between the cars and to effect as rapidly as possible other improvements necessary for proper service to the public.

The position of the commission in the matter was set down as follows:

So long as the company is performing a necessary service it is entitled to be compensated for that service by an amount which will cover its costs, and will yield a fair profit on the use of its property, and this commission will authorize the company to collect a rate which will yield that cost and profit, so long as it is reasonable and no more than the commission feels the service is worth to the public. But the company cannot depend upon regulation and increasing rates to save it from ultimate disaster, if, because of the auto-mobile, or any other new agency of transportation, its service becomes obsolete, and the use of that service is confined to com-paratively few people. The company has been protected from jitney competition and its rates have heretofore been raised to meet increasing costs of rendering service, but there is a limit beyond which the commission cannot go in permitting higher rates to meet, not increasing costs of doing business, but failure to earn a sufficient return, due to the falling off of business.

In a lengthy opinion handed down with the order, the commission set forth an estimated return for 1928 under the new fare rate, allowing for a 2 per cent falling off in full fares. The rate of return was given as 6.26 per cent.

The commission recently reduced the value of the United's easements from \$7,000,000 to \$5,000,000, bringing the value of the company's property to \$75,-000,000, and it was this last-named figure that was used as the base for calcu-

lating the return.

It was said by the commission that it believed the falling off in riding was due, not to the amount of the fare, but in part to the slump in business and in still larger part to the more general use of automobiles. This automobile competition, the commission said, promised to be greater this year than it was last. "Much has been said about the loss of the short rider and this is often attribnted to the price of the car ride," said the commission. "This may be true in some cases, but it does not appear to be so with a great many. To the extent that the short rider has been lost, this loss is due, it seems to the commission, not so much to the cost of the ride but to the length of time the ride itself takes. This is due to the congestion in the streets, caused by the automobile which not only cuts into the revenues of the company but slows up the operation of the street cars, so that an ordinarily vigorous person frequently can walk through the congested business section in less time than he can make the journey on a street car. With automobiles parked on each side of a street all traffic is forced on the car tracks, slowing up the cars and making street car operation more costly, for the slower the cars run,

the more expensive it is to operate

A controversy between Mayor William F. Broening and Harold S. West, chairman of the commission, brought about by the commission's discussion of the park tax paid to the city by the United. The Mayor contended that the part of the opinion dealing with this subject was gratuitious criticism and difficult to understand. According to the opinion an element in the railway situation which resulted in higher fares was the park tax. It was purely and simply a tax on the street car riders for the support of the city parks. The company did not pay it. It was paid by the riders and the company simply acted as a collector, receiving approximately onehalf cent on each fare the rider paid and turning the money over to the city quarterly. It was, perhaps, a tax on the company in former years, but now it was an expense which must be deducted before any rate of return is calculated. The result was that for the maintenance of parks, stadium, swimming pools, tennis courts, golf courses, baseball fields and park roads, maintained for automobilists, car riders have contrib-nted since 1910, when the company was put under Public Service Commission regulation, the sum of \$15,406,794. This, of course, is in addition to the general taxes and such special charges as those made for street paving and for maintaining the paving between the tracks and for two feet on each side.

The opinion stated that an arrangement might be made by which the city would consent to the passage of an act reducing the amount of the tax I per cent a year, which would gradually relieve the street car riders of this burden and wipe it out entirely in a period of nine years.

Significant in the opinion was the statement that the service rendered by the company was a necessary and vital thing to the people of Baltimore. This was indicated by the fact that the demand upon the system during morning and evening rush hours was almost greater than the company could meet. Time was when the service was used for pleasure. The motor car has largely taken the place of the street car for pleasure riding. The street cars are used only by those who find them necessary or convenient to get to and from places of employment, or for other trips about the city. It would be practically impossible for all the people who use the street cars to reach their places of business or employment, and return to their homes, by any other means of transportation now available. And if the service is necessary to them they cannot expect to be transported for less than the cost of transporting them, plus a fair return for the use of the agency of transportation. Even at somewhat increased cost it still would be the cheapest form of transportation the people could get.

That the extension of the railway system into the suburbs has resulted in the development of the sections which the lines serve is beyond question. Even in these days of almost universal use of the automobile, property values, except perhaps in that part of the city as it existed prior to the annexation of 1888, are dependent largely upon street railway transportation. Withdrawal or material curtailment of service would be felt immediately in the lowering of real estate values, for there is no transportation agency which would give so comprehensive a service at such low cost.

Moreover, the development of property and the creation of higher values along the outlying lines of the company often have been largely at the expense of the company. While creating increased values in land by the extension of its lines and service, thus benefiting immediately the property owner (and the city and county by increasing the taxable basis), the company has no way of sharing in the increased values it creates until the time comes when there

is sufficient development in new territory to produce enough traffic to make the operation of the lines compensatory. Until that time is reached, the company is compelled to give service to new territory at a loss.

One reason for the company's plight today the commission believed was the fact that following annexation in 1918, the city zones on the street car system were extended to the new city line, this line for nearly the entire distance around the city having been extended about two miles. Annexation, while a desirable thing for the city, did not benefit the railways. It imposed additional obligations upon it, and when extensions of fare zones were made it caused extensive loss of revenue which had to be made up through rate increases. fact, taking all things into consideration including auxiliary bus lines and the like, the commission believed that car riders as a whole today received relatively much more for the fare they paid than they ever received for a 5-cent

In the opinion of the commission Counsel Toole's theory that the company should be forced into a receivership where a proper reorganization could be effected would mean no good but much harm to the car rider and the

whole community.

The commission does not believe that the company's credit can be permanently bolstered up or maintained by the payment of dividends as long as its financial set up remains as at present. It says the structure is top heavy. There are too many bonds outstanding in proportion to the stock. The stockholders have too small an equity in the property. Including its notes, the company has outstanding \$67,176,200 in securities representing funded debt and \$20,461,-200 in stock. Not only is the par value of these securities \$12,637,400 in excess of the value of the property as fixed by the commission, but the ratio of funded debt to total capitalization is approximately 76 per cent. The ratio of funded debt to value of the property found by the commission is approximately 90 per cent. The commission believes that the ratio of debt to stock ought not to be greater in a company of this sort than 67 to 33, and does not believe its credit can be permanently established and maintained until approximately this ratio is created. It is of the opinion that the par value of the securities ought not to exceed the value of the property as found by the commission, and, for safety, should be even less than the value found. The commission says:

It must be remembered that the value of this property was established largely on present-day costs, which had increased very much in the years immediately preceding the valuation. The time may come when reduced costs of reproduction may necessitate a lower valuation, in which event, if the par value of securities is now scaled down only to the commission value, the company again may find itself in the position it now is in; that is, with securities outstanding exceeding in par value the then value of the property.

According to the commission there

Cash Fare Token Fare	@	9 81	centscents		Number of Passengers 7,180,730 191,753,540		Revenues \$646,226 15,979,46
Total full fares First county zone Second county zone Third county zone Bethlehem steel ticke Miscellaneous Half fares School	@		cents		198,934,270 2,600,000 270,000 45,000 1,600,000 8,000 8,080,000 3,880,000		\$16,625,723 117,000 13,500 2,256 80,000 404,000 193,000
					215,397,270		\$17,435,87; 235,000
Operating expenses.		,				\$10,303,944	\$17,670,877
Taxes Property Park tax						487,110 1,168,204 138,469	12,981,27
Operating incom	e						\$4,689,606 171,000
Gross income Deductions from gro	se in	om	e				\$4,860,606 3,445,000
Net income							\$1,415,606
Per cent of return or	ı bas	e of	\$75,000,000.00, per cer	t			\$4,731,600 6,31
Deauct 340,000 from			venues for Halethorpe				6.26

are other defects in the company's financial structure in addition to the disproportionate ratio of bonds to stock. It is admitted that under present conditions the company cannot sell junior securities, such as preferred and common stock, to obtain money for capital expenditures. Nor can it issue bonds on the property of The United Railways & Electric Company of Baltimore in order to secure new capital, because the company has a closed mortgage and any new property obtained is immediately covered by that mortgage. For such new capital as it may obtain and for which it must issue bonds it must adopt the expedient of issuing these bonds in the name of a subsidiary, The Maryland Electric Railways, procuring property with that money, and then leasing the property to the United for a sufficient sum to pay the interest on the bonds and provide for their retirement at maturity. The commission says:

A reorganization of the financial structure of the company would naturally result in the substitution of a more flexible mortgage for the old closed mortgage. This would enable the company to provide for its capital requirements by the issuance of new securities as new property is required, on the basis, perhaps, of 67 per cent of bonds and 33 per cent of stock.

While the commission recognizes it has not the authority to order any such reorganization as is here outlined, it trusts that the company will take the problem under earnest consideration and work out a plan of financial reorganization that will help solve its difficulties concerning credits. The commission said:

In every rate hearing in which an in-crease has been asked, emphasis has been laid upon the importance of establishing a rate which would sustain the company's credit, and which would enable it to borrow money for its capital expenditures at lower rates. Recently emphasis has been laid upon the paying of dividends in order to maintain credit, and increase the borrowing capacity of the company. The commission did not believe credit was helped by paying dividends out of surplus when they have not been earned, and by distributing the money held in the surplus account to the stockholders, from which it cannot be recovered, rather than retaining it in the surplus account where it is, at least, an actual, tangible basis for credit. The commission has no comment to make upon the statement that money in the surplus account actually belongs to the stockholders, and that it is the right of the stockholders to have it paid to them in dividends. So does the surplus actually paid in by the stockholders of a bank belong to such security holders, but it is not paid hack to them in dividends, particularly when earnings are low, as a means of maintaining the bank's credit.

In any rate of fare allowed, out of which dividends may be paid, it is not allowing that amount for the payment of dividends for the sake of maintaining the company's credit, but because the company is entitled to that amount of surplus as a matter of right; and the company, in the exercise of its own discretion can pay it out in dividends or retain it in its surplus account.

Of the value on which the return is computed the commission said:

In Case No. 533, decided on Feb. 1, 1928,

the commission fixed the value of the company's property at \$75,000,000 as of Dec. 31, 1923, of which sum \$5,000,000 was for easements. The company claimed that, subsequent to the date of the valuation, net additions had been made which would add \$1,005,270 to the above value. People's counsel, questioning the amount of increased valued claimed by the company, attacked the bookkeeping methods of accounting for additions where old trackwork is replaced and declared that the \$1,005,270 should be nearer \$200,000. His witnesses also pointed out that a decrease in construction costs had taken place between 1923 and 1927 and that this factor, if given the same weight as was given the cost of reproduction by the commission in fixing its value, would tend to indicate a decrease rather than an increase in the 1923 value. In considering all facts which to it seem relevant and particularly, as the relatively small amount in dispute might easily be offset by a slight fluctuation in price levels, the commission is of the opinion that the proper value to be used, at the present time, as a test of the reasonableness of the rates to be fixed in this proceeding, is \$75,000,000.

The new fare rate created chaos for the first two days it was in effect. Almost all the 2,500,000 tokens the company has, had been hoarded by the riders, who had purchased them for $7\frac{1}{2}$ cents. It was expected that when the new rate became effective these would come back immediately. But they did not.

Almost all persons boarding the cars offered to buy tokens but the conductors were unable to supply them. Under the circumstances the Public Service Commission ordered that 8 cents be paid as the cash fare. But in many instances the conductors were unable to make change and the patrons in many cases paid fare of only 5 cents.

In order to meet the situation the United wired an order for an additional 1,000,000 tokens, to be supplied in lots of 100,000. But two days later the old tokens began to return to the company and there were few cases where conductors were unable to supply them. The entire situation is now becoming straightened out.

Weather Bureau in Gary Run by Railway

A new and unusual service to the public was recently started by the Gary Railways in the form of an official weather bureau for the city of Gary, Ind. Several weeks ago the company purchased a complete set of weather recording instruments in order to obtain accurate information in advance of storms, thus being able to muster its track forces in time to keep snow and ice from interferring with operations and incidentally to anticipate a considerable saving on storm-fighting equipment.

Conceiving the idea of making the information available to the public, the company made an agreement with the Gary Post-Tribune, the local daily newspaper, to furnish local temperature and harometer readings each day on the front page of the paper in a "weather column." The name of the company appears in a credit line at the top of the column.

Paving Exemption Included in East St. Louis Franchise

A petition presented to the East St. Louis, Ill., City Council on Feb. 7 by the East St. Louis & Suburban Railway asking for a twenty-year franchise for its State Street line contained a clause exempting the company from paving between the tracks from 20th to 21st Streets. The company also asked that the franchise be transferred to the East St. Louis Railway. This follows the plan for the construction of a reinforced concrete viaduct to carry the terminal railroad belt line tracks over State Street. The steam railroad would pay for the viaduct, the city for depressing the street and the electric railway would defray cost of relaying its tracks. The main carhouse of the East St. Louis & Suburban Railway is near by and the cost to that company would be about \$60,000. If the City Council passes the new franchise it will be submitted to a vote of the citizens.

More Moves to Restore Service in Columbia

Several legal moves have been made in the transportation muddle in Columbia, S. C., within the past few days, but no street cars have moved, nor buses, and, except for the unregulated 10-cent jitney, the city is without any system of public transportation. The street cars, operated by the Columbia Railway Gas & Electric Company, were withdrawn in March, 1927, and the buses were in operation until midnight, Dec. 31, 1927, when they too were withdrawn, leaving the field entirely to the jitneys.

The Columbia City Council passed an ordinance directing the Broad River Power Company—the concern which furnishes power, light and gas to the city—to operate the cars. The Broad River Power Company disclaimed any responsibility in the matter and the Columbia Railway Gas & Electric Company then went into bankruptcy. A federal judge granted a stay of all proceedings involving in any way the property of the Columbia Railway Gas & Electric Company, which owns the lines, rails and equipment. Attorneys for the state and city have filed a petition to have the bankruptcy order vacated. Arguments on this matter will be heard in March.

Meanwhile a bill has been introduced in the General Assembly, now in session, to give the Columbia City Council full control over the city streets—a bill which, it is believed, will drive the jitneys off the principal streets. The jitney union wants the bill killed. Labor leaders contend that no public transportation system can be successful unless it has the support of labor. They want union men put in charge of buses or street cars or whatever may be put on the streets.

And so the people look to the jitney, at present, for transportation.

Chicago Rapid Transit Petitions for 10-Cent Fare

Evidence bearing on the application filed by the Chicago Rapid Transit Company for an increase in fare to a flat 10-cent rate was heard by the Illinois Commerce Commission in Chicago on Feb. 14. The company is asking for the abolition of the three-for-a-quarter tickets and the \$1.25 weekly pass in Chicago, Oak Park, Forest Park, Cicero and Berwyn. The existing fares of 3 cents for children more than seven and under twelve and of 5 cents for school children under seventeen years as well as the 25-cent round trip rates to Evanston, Niles Center and Westchester will remain the same. The new cash fare of ten cents which would increase the company's gross revenue about \$3,845,-000 annually, will automatically become effective within 30 days unless the commission orders a public hearing on the reasonableness of the new rate.

Formal announcement of the application for a higher fare was made by vice-president Bernard J. Fallon, coincident with the issuance of the company's annual report to stockholders. The additional revenue is needed by the company Mr. Fallon said for the purpose of acquiring additional equipment, renewing present equipment, making necessary improvements and to provide a reasonable return on the capital investment of the company.

He maintained that although traffic had increased from 204,000,000 passengers in 1923 to 226,000,000 in 1927, the return on the appraised value had been only 3.5 per cent last year. In that period the company put more than \$6,000,000 of new capital into the

property.

The hourly wage increase of 1 cent which was granted elevated trainmen last month as a result of prolonged arbitration was also set forth by Mr. Fallon as an additional expense.

Commenting on the proposed fight to be waged by the city, David H. Jackson, chairman of the Illinois Commerce Commission, declared that the rate would not be allowed for at least 120 days in order to give interested parties time to make investigations. He added that there might be a second suspension of six months if the case were not concluded during the first four months.

Bon Voyage to Engineers!

A vacation in Europe, combined with the study of engineering and industrial problems under the direction of experts, is an attraction for this summer under the direction of Prof. N. C. Miller, director of University Extension Division, Rutgers University, State University of New Jersey and of the School of Foreign Travel, New York City. The tour is designed for factory and public utility executives, instructors and students in engineering colleges, and others interested in business, industrial and engineering prob-

lems, who wish to study these subjects and at the same time have the opportunity of seeing the various problems treated in Europe. The itinerary has been planned to give the widest contact possible to the leading industrial sections of England, Belginm, Germany and France. College credit can be gained in industrial engineering and mechanical engineering if desired.

The price is \$570, which covers a period from July 14, the sailing date, to Aug. 24, when the tour is expected back in New York. Detailed information regarding the specific outlines of the courses and arrangements for University credits may be had by writing to N. C. Miller, Rutgers University, New Brunswick, N. J., or to School of Foreign Travel, Inc., 110 East 42d Street, New York City.

Interborough Case in Courts

State Supreme Court, at instance of city and Transit Commission, issues injunctions against fare increase as railway starts federal action

BOTH sides in the 5-cent fare controversy in New York City appealed to the courts on Feb. 14. In doing this the Interborough Rapid Transit Company, which has filed a new 7-cent schedule effective March 3, next, made good its threat to go to the federal courts for relief. The company sets forth that the 5-cent fare is in violation of the federal constitution in that it is confiscatory. It asked the court for a decree enjoining the city from enforcing the 5-cent fare provision.

CITY AND COMMISSION MAKE MOVE

The city and the New York Transit Commission, later in the day, went into the Supreme Court of the state and were granted three temporary injunctions, all returnable on Feb. 20, designed to prevent the Interborough from charging more than a 5-cent fare. The State Transit Commission, at a special meeting, rejected the Interborough's new 7-cent fare tariff and dismissed the application for the higher rate.

No injunction was asked by the Inter-

borough because none was needed until such time as the new rate of fare becomes effective on March 3 and then, if the city seeks to restrain the company from putting the fare in effect, the Interborough will seek intervention of the federal court through an injunction. If granted this would permit exercising of the new rate schedule until such time as the equity of the situation reasonable.

the new rate schedule until such time as the equity of the situation, reasonableness of the fare and company's claim of confiscation under the 5-cent schedule, is settled by the federal court. If the injunction is granted the company, a procedure similar to that of the gas rate cases would apply. This would involve naming a master to hear testimony and report back to the court. Then, if the company proves its case before the master and the court approves the master's report a permanent injunction

would follow. After this, if the city

desired, it would appeal on up to the United States Supreme Court.

As to the effectiveness of the state court's injunctions, presuming they are made permanent after the Feb. 20 hearing, legal opinion is that this will be a matter for the federal court to decide, i.e., whether the state court's injunction is valid in view of the equity bill placed before the federal courts on the ground of the 5-cent rate being in violation of the federal constitution.

The injunction orders were issued in the Supreme Court of New York County by Supreme Court Justice Edward J. Glennon. Three suits are filed, one by the city asking the court to compel the Interborough Rapid Transit Company to observe the rights of the city under the dual contract and to enjoin the company from raising the present rate of fare. The second action, which covers approximately the same points, was filed by the Transit Commission in behalf of the city. The third action is a special action brought under the public service laws designed to prevent violations of the law when threatened.

The Interborough filed suit in the federal court against the Transit Commission and the city of New York in its fight to obtain a 7-cent fare. The company asks the federal court for a decree enjoining the city from enforcing the 5-cent fare provision of the dual contract on the ground it is confiscatory.

It asks similar decrees against the order of the Transit Commission providing for the lengthening of station platforms at the company's expense and directing the purchase of 432 new cars. A further decree is asked to prevent the city from moving to seize or operate the company's lines.

By this move the Interborough Rapid Transit Company is believed to have brought the entire mass of transit litigation into the jurisdiction of the federal courts. The normal procedure will be for a motion date to be set on which the court will hear argument on the motion of the company for a temporary re-

straining order.

Senator Philip M. Kleinfield has introduced a bill at Albany providing for a transit authority to take over and operate existing rapid transit lines and build new ones. It would have power to issue bonds for construction of new transit facilities, and the only restriction placed upon it requires that a fare not to exceed 5 cents could be charged. No jurisdiction over existing transportation facilities or those under construction is given the proposed organization, but it would have control over future facilities.

Hearing in Ottawa Set

Hearing on the petition of the Ottawa Electric Railway, Ottawa, Ont., for an 8-cent fare or seven tickets for 50 cents will be held before the Board of Railway Commissioners on March 21. The case for the city of Ottawa, which is opposing the application, will be presented later. The present fare is 5 cents.

For Distribution on Rochester Cars

The Trolley Riders' News, a tiny newspaper issued bi-weekly by the New York State Railways, Rochester lines, made its appearance on the street cars of Rochester on Feb. 1. The aims of the new publication, which is along the lines of similar organs in other large cities, are told in the following paragraph in the initial issue:

This is the first number of a new publication dedicated to our trolley patrons in Rochester. In addition to being published in the interest of public safety, it will bring before you interesting news of the trolley world and acquaint you with important facts about the street car.

Leon R. Brown, safety director of the railways in Rochester, is editor of the new sheet. Mr. Brown is also editor of the railways' house organ, Transportation.

A Challenge to Stone & Webster Employees

A design and slogan are wanted by Stone & Webster, Inc., which with appropriate wording might be used as a standard trademark for advertising purposes.

Its letter runs in part as follows:

The wording used in our present advertising is "Design, Build, Operate, Finance." Perhaps some one can suggest something It must consist of very few words, must be in keeping with best traditions of an organization of our size, and should tell a big story in a brief, forceful manner.

It is probable that this want can be supplied by the members of our own family and suggestions from everybody will be welcomed.

Action on Chicago Bills Awaited

Drafts of legislative bills providing for the consolidation of the traction companies of Chicago and the establishment of the terminable permit now pending before the Chicago City Council local transportation committee have been approved by representatives of the companies. The committee has begun discussion of the new drafts of these bills and also of the other bills pending for the proposed settlement of the trac-Action is expected tion situation. within a short time. Mayor William Hale Thompson and Governor Len Small have reached an agreement gle shipment via the company's lines.

whereby the Mayor will support the Governor in the coming April primary as the result of an understanding on several things Chicago wants. One of these is traction legislation and the Governor has agreed to call a special session of the Legislature soon after the primary in case the city and the companies reach an agreement on the terms of the proposed legislation.

Parking Areas in Philadelphia Declared Popular

The auto-parking areas of the Philadelphia Rapid Transit Company at the suburban terminals of the Market-Frankford elevated line in Philadelphia, Pa., have proved popular. A fee of 25 cents is charged for all-day parking, which includes a ride downtown and back. Thus 209,000 automobiles were kept out of the downtown streets during 1927. This proves beyond question. according to the company officials, the usefulness of this service to the individual motorists living tributary to the high-speed lines.

Red Apparel in Richmond Means Danger

Brilliant red suits will soon become the regulation attire of employees of the Virginia Electric & Power Company, Richmond, Va., who work on tracks in the streets. The decision to dress the men conspicuously was reached following a series of accidents in which track employees were struck by automobiles.

In an attempt to reduce the number of accidents on the Richmond-Petersburg Turnpike, which is traversed by the Richmond-Petersburg interurban electric railway, the fronts of interurban cars will be illuminated by floodlights. It has been found that automobilists, seeing the one headlight of an approaching electric ear, mistake it for the light of a motorcycle, and assume they can cross the tracks safely.

In Michigan Transporting Furniture Becomes a Science

An unusual consignment in the transportation of furniture was accomplished recently by the Michigan Railroad. Fifteen carloads of furniture loaded at Saginaw, Mich., and destined for Battle Creek, Mich., were transported as a sin-

Railway Matter Reopened in Toledo

Efforts are being made to bring together the members of the Board of Street Railway Control, representatives of the Community Traction Company, and Mayor W. T. Jackson and cabinet members at a meeting in the near future to discuss the railway situation in Toledo, Ohio, with a special view to a solution of the power rate issue, determining a program of repaying of car-track streets, and also discussing the possibilities of a revision of the Milner service-at-cost franchise.

Incidentally it is expected the railway situation in Toledo will assume a different character the first week in March when under the terms of the present franchise ordinance the sinking fund payments will cease.

Through the operation of the sinking fund, 20 per cent of the capital value will have been retired. Under this plan, during the little more than six years' operation under the franchise approximately \$1,800,000 of the 6 per cent bonds of the company have been retired and an equivalent par amount of common stock issued to the city of Toledo.

But the noteworthy feature of the suspension of the sinking fund will be the effect on income and outgo of the company. A difference of nearly \$28,-000 a month will result and this is almost enough to throw operations from red into black as regards the stabilizing fund.

In view of this fact and the results obtained in recent months in the cutting of expenses of operation to the minimum by the management, the railway board members have asked Mayor Jackson to look into the power situation. A power rate has never been definitely established and agreed upon since the operation of the ordinance. It is pointed out that company officials agreed to a revision of the rate in recent franchise negotiations. The power problem will probably be a means of opening up negotiations with the new city administration on the whole franchise matter. The possibility still exists that if the power rate matter can be adjusted the board may favor working along under the present ordinance to ascertain the results of operation without the burden of the sinking fund.

While more than \$1,800,000 has been set aside for sinking fund purposes the company has gone in red on its stabilizing fund \$1,272,369.



Fifteen carloads of furniture made up this unusual shipment

Bay City May Walk Again

After having lost its railways in 1921, Bay City, Mich., now is threatened with the loss of the bus service, upon which it has depended since that time. Allen B. Doran, bus line operator, refused to comply with a recommendation to have nothing but new buses on the streets. Bus line operators appeared before the City Commission and stated they could not afford to operate the buses on a 5-cent fare. Mr. Doran asked the commission to allow him to operate his buses as long as they were in good condition. City officials told him that with no franchise they could put him off the streets at any time. He predicted that all city bus lines would fail.

Fare Schedule at Poughkeepsie Changed

The Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., has, with the approval of the Public Service Commission, arranged to sell a weekly commutation ticket book with coupons attached equivalent to 12 rides in and between the city of Poughkeepsie and the village of Wappingers Falls for \$1.75. Tickets will be honored during the week for which sold (Sundays excluded). The sale of monthly commutation ticket book (52 rides for \$7.80), for transportation in and between city of Poughkeepsie and village of Wappingers Falls, has been discontinued.

Chicago Judge Denies Injunction Against Parking Ban

Under a ruling of Municipal Court Judge Oscar Hebel on Feb. 11, opponents of the no-parking ordinance in the downtown loop district of Chicago, were denied a temporary injunction against the regulation. Attorneys for the petitioners, who for the most part consist of small shop owners and restaurant proprietors, immediately asked permission to file an amended bill, arguing that the parking ban is a detriment to "loop" business. One week was granted by Judge Hebel for an amended petition to be filed. It was said by court representatives that the taking of testimony on the new petition will require about 60 days, during which time the ordinance will remain in effect, thus giving it more than the three months' tests which were urged by proponents at the time the law was enforced on Jan. 10.

Boost Railway Idea in McAlester

An organization of employees formed to put the Pittsburg County Railway before the public is the talk of the hour in McAlester, Okla. Regular monthly meetings are held at which plans for promoting the welfare of the company are discussed. The slogan

adopted by the organization is "ask any Pittsburg County railway employee." W. H. Goodner, promoter of the club, said that the organization desired the public to know that whatever information it wanted, especially if it were something pertaining to transportation, the information was to be had for the asking.

Madison's Future Uncertain

The City Council of Madison, Wis., has voted 16 to 4 to submit a referendum to the people at the election in April on the question of the city's taking over the Madison Railways. This action is the outgrowth of an increase in fares allowed by the Wisconsin Railroad Commission and also the charge by the commission that the financial statement of the company contained an incorrect entry.

Since the charge was made, F. W. Montgomery, president of the company, explains that in 1921 he canceled an advance of \$73,951 which he made to the company, and that in 1924 the board of directors felt he was too liberal in foregoing the payment of this amount and voted that the company should repay the sum. Mr. Montgomery said:

Neither I nor other officers regarded this action as creating a liability in such a way as to make it necessary to enter this item on the books of account.

Learning that the Railroad Commission construed this transaction as a liability which should have been entered on the books, the board of directors at my request has rescinded and annulled the resolution of 1924 and has canceled said item of \$73,-951 and I have returned to the treasury of the company everything which I have received pursuant to the resolution of 1924.

Something New in Free Rides in Buffalo

Members of the Rotary Club of Buffalo, N. Y., and the Greater Buffalo Advertising Club received a poetic token and an actual token from the International Railway during the past Christmas season. The street car token was glued or stapled to a card $6\frac{1}{2}$ in. x 4 in., with a poem printed in green and signed "I.R.C. Men and Management."

The poem ran as follows:

Here is a token of warmest good will From those at your service, good weather

They'll carry you quickly, at any old time, To business or pleasure, for less than a dime;

And whether your purpose be labor or lark, There's this great advantage—you don't have to park.

Through mazes of traffic your way we will wend,

While you read your paper, or chat with a friend.

Man, it's even a cure-all for family strife— You can leave your car home for your good friend, the wife. As for service—we'll tell you what every-

one knows—
The more that you use it, the better it grows!

Courtesy in Dallas

A courtesy campaign among its trainmen has been launched by the Dallas Railway & Terminal Company, Dallas, Tex. "The passenger is always right" is the slogan that has been adopted by George I. Plummer, superintendent of traffic. "Always treat a passenger as you would want a member of your own family treated," Mr. Plummer told the trainmen at a recent meeting held to acquaint the men with the details of the courtesy campaign. It is planned to continue the campaign for one month, during which reports will be studied.

The Contribution of the Utility to the Community

In a series of fifteen full-page educational advertisements in the New York Times Annalist, the Penn-Ohio Edison Company is discussing the important places the utilities occupy as integral parts of the communities they serve. Since the Penn-Ohio Edison Company's subsidiaries supply the district about Youngstown, Ohio, and New Castle, Pa., with electric light and power service, and electric railway and bus service, the advertisements tell of the growth of the Youngstown district and of the contribution made to that growth by the public utility service.

Emphasis is placed by the company on good service, good public relations, safety of investment, and public confidence. One of the advertisements is devoted to "Gold Medal Transportation," the heading being inspired by the fact that the electric railway lines of the Pennsylvania-Ohio Electric Company, a subsidiary, won the Charles A. Coffin gold medal and award for 1926. Ray P. Stevens, president of the American Electric Railway Association, is president of the Pennsylvania of the Pennsylvania, is president of the Pennsylvania.

Ohio Edison Company.

Mirrors and Improved Dressing Rooms for St. Louis Employees

Motormen and conductors of the St. Louis Public Service Company are to be provided with improved dressing rooms equipped with full-length mirrors to "dress up" prior to taking their cars on the road. This innovation in transportation circles was advocated by Stanley Clarke, executive vice-president of the company, at a meeting of the Engineers Club of St. Louis on Feb. 8. The subject of Mr. Clarke's talk was "The Future of Mass Transportation."

He said an effort was being made to make street car service an acceptable commodity to all persons and to sell it as such. "A very forward start," he claimed, "toward better service is the 'dressing up' of the operating staff

'dressing up' of the operating staff. Sunday pass sales numbered 20,408 on Jan. 15 and increased each Sunday thereafter through Feb. 12. For Jan. 22 the record showed 26,398; Jan. 29. 28,931; Feb. 5, 30,161, and Feb. 12. 35,360.

Recent Bus Developments

Eighty Cents for Texas Bus Trip

The application of the Texas Motor Coaches, Inc., Fort Worth, for authority to increase its one-way bus passenger rate between Fort Worth and Dallas, 35 miles, from 50 cents to more than \$1 has been denied by the Texas Railroad Commission. The commission prescribed a fare of 80 cents for the trip. In its order the commission made it clear that this rate is not necessarily a precedent to guide adjustments, because state regulation of bus lines is not old enough to allow determination of a basic cost of operation.

The Fort Worth-Dallas rate was

ordered on the stipulation that the company put on modern, up-to-date equipment within 30 days on the penalty of cancellation of the increased fare. The round-trip rate was set at \$1.45, good for return in ten days. minimum fare between any two points was made 25 cents. The commission held the company's valuation of \$308,000

to be too high.

Electric railway fare between the two cities is approximately 90 cents. The Texas Motor Coaches, Inc., as organized in 1927, is under sponsorship of the Northern Texas Traction Company.

Petition in Chattanooga Includes Bus Service

At a recent hearing before the Tennessee Railroad & Public Utilities Commission, the Tennessee Electric Power Company agreed to start a bus line to accommodate the Red Bank patrons of Chattanooga and promised to give transfers over its cars and bus lines within the city of Chattanooga. A franchise for such bus operation has been granted the company by the city of Chattanooga, and also the county of Hamilton. Bus service was suggested by the company at recent hearings when the company petitioned to abandon service to Red Bank. At a previous hearing permission was denied.

Chicago-Gary Coaches Compete

One-way fares on coaches of the Shore Line Motor Coach Company operating between Gary and 63rd Street, Chicago, were cut from 50 cents to 30 cents on Feb. 1. The following day, the Midwest Motor Coach Company, which also operates between these two points. announced a like reduction. Later in the week, the Shore Line Company again lowered its rates successively to 25 cents and 20 cents. The new rates were met immediately by the competing According to officials of the Shore Line Company, which is controlled jointly by the Gary Railways and the Chicago, South Shore & South Bend Railroad, the reductions were made with

a view to stimulating the winter traffic. As the new rate conflict was getting under way the Midwest Company started the operation of a new bus line

between Hammond and Chicago with regular 20-minute daily service on a 25-cent fare. The new route is in direct competition both as to service and fare with the Hammond-Chicago line of the Shore Line Motor Coach Company.

Permission for Illinois Bus Routes Sought

A petition has been filed by the Illinois Power & Light Corporation with the Illinois Commerce Commission for authority to establish bus routes between Venice and Lincoln, Springfield and Riverton, and Staunton and Hillsboro, supplementary to the present railway service. The utility, however, says that it does not desire to bid for local business in the Springfield and Lincoln territory now served by the Illinois Power Company and the Lincoln Street Railway.

Interstate Regulation of Motor Carriers Argued

Federal control of common-carrier motor highway vehicles generally favored at Washington hearing. Truck operators oppose proposal

Feb. 10 on the question of whether it should recommend to Congress legislation providing for a plan of federal regulation of the operation of commoncarrier motor highway vehicles in interstate commerce.

The arguments were directed to a proposed report by Attorney-Examiner Leo J. Flynn, of the commission, made public recently following an investigation of bus and truck operation, in which he recommended a plan of federal regulation which would employ state authorities or joint boards of state commissioners as agents of the Interstate Commission, subject to an appeal to the federal commission.

Federal regulation of buses was generally favored by those who presented arguments, but the manufacturers and operators of motor trucks in freight service objected to regulation because it would retard development.

Alfred P. Thom, general counsel of the Association of Railway Executives. which favors federal regulation both of buses and trucks when engaged in interstate commerce, praised Mr. Flynn's proposed report. He urged, however, that there should be but one system of federal regulation, applying alike to subsidiaries of railroads operating buses or trucks, and to carriers not subject to the act to regulate commerce. He said there is no occasion for different treatment of the carriers controlled by railroads. If certificates of public convenience and necessity, issued by the Interstate Commerce Commission, should be required before a railroad may extend its service. as under the present law, he said, he saw no reason why the same requirement should not apply to an extension of service or the operation of a new service by motor vehicle or a joint service by rail and motor vehicle.

A. J. Brosseau, president of Mack Trucks, Inc., and chairman of a special committee representing the manufacturers of motor trucks, opposed the rec-

ARGUMENTS were heard by the ommendation for regulation of motor Interstate Commerce Commission on truck operations. It is the unanimous judgment of the members of the special committee, after a thorough study, he said, that there is no evidence in the record showing a demand by the shipping public for such regulation or any need for it. He said:

The bus situation is somewhat different. The best bus service is operated over fixed routes and on definite schedules and the evidence points to the need for some reg-I hope that you will proceed slowly. Your recommendation to Congress may have the effect of either promoting or retarding the development of this

Mr. Brosseau quoted from a statement by Ralph Budd, president of the Great Northern Railway, which he described as one of the greatest bus operators in the country, in which Mr. Budd urged that the management be left as free as possible while the business is in a stage of development and that the requirement of certificates for interstate operation seems to be the principle thing needed.

R. Bradley, representing the American Electric Railway Association. said that the association has been recommending regulation of motor vehicle transportation for the last three years. He said:

We find the report of the attorneyexaminer very comprehensive and funda-mentally sound. We feel keenly that there should be some legislation now and amendatory legislation can be added as the need for it develops.

S. A. Markel, counsel for the Bus Division of the American Automobile Association, praised the report of Mr. Flynn as a "remarkable piece of work" and said that speaking for "the fellows who are to be regulated" he was in favor of immediate legislation. He urged, however, that the regulation be simple at first, rather than restrictive. Mr. Markel agreed that the question presents difficulties but thought they could be obviated. He suggested that members of state commissions might sit together as

joint boards but that their actual decisions might be rendered in their own states separately.

The principal objection presented by Mr. Markel to the adoption of the examiner's report was in regard to considering of "existing agencies" in granting certificates for operation of bus lines. He declared that if this language is used it means that the effect on the revenue of "transportation agencies" already operating in the territory must first be considered. He made this recommendation for requirements in granting certificates of public convenience and necessity to bus lines:

The law should provide that the fact than an applicant for a certificate of convenience and necessity was in bona fide operation one year prior to the opening date of the legislative session at which the law is passed, and since then and at the time the application is made has been continuously so engaged, shall be considered prima facie evidence as to the convenience and necessity for such operation.

The National Automobile Chamber of Commerce has filed with the commission a statement of exceptions to the attorney-examiner's report, signed by C. C. McChord, R. Granville Curry and Frederick M. Dolan, of counsel, stating that "there is no necessity or public demand for legislation. The time has not yet arrived for federal regulation of the common carrier motor truck."

Proud of Safety Record in Duluth

An enviable safety record has been made by eight motormen of the Duluth Street Railway, Duluth, Minn., during the past few years. One man served ten years without a serious accident. The three leaders in the record-making safety campaign are: Bernt Lodgaard, J. P. Ryan and Alfred Sicotte.

In August, 1926, the company started a campaign of safety among car operators, including city bus drivers, and has divided the operators into ten teams of 26 members. The year, during which the personnel of the teams remains the same, is divided into four quarters and the winning team for each quarter announced. E. T. McManus, head of the claim department, has charge of the contests.

Buses on Cincinnati Parkway

Walter Draper, president of the Cincinnati Street Railway, Cincinnati, Ohio, has sent a formal request to C. O. Sherrill, city manager, for the use of the city's Central Parkway for the operation of buses of the Cincinnati Street Railway. It is anticipated that the application will be granted. The Cincinnati Central Parkway is the down-town surface of the unfinished rapid transit system, completion of which, underground, has been in controversy many years. Mr. Draper recently stated that his company would complete and operate the system if given proper guarantees against loss.

Financial and Corporate

Milwaukee Company Does Well

609,417 more passengers carried in 1927 than 1926. Many improvements to transportation units. Slight decrease in net

N ET capital expenditures of \$6,022,-048 were required in 1927 by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to meet the growing demands for electric heating and transportation services. Net income for the year was \$3,966,905 as compared with \$4,025,698 in 1926. In its railway utility operations the company has been constantly mindful of its obligation to provide modern and adequate transportation facilities for its One-man car operation was extended to additional city lines, and more frequent and rapid service was provided on interurban lines. Extension of street railway tracks and service, and considerable track reconstruction work occupied a major part of the railway utility program. The system carried 210,786,573 passengers in 1927. This was an increase of 609,417 over 1926.

Some of the more important development on city lines during the year were:

Extension of street railway tracks and service along Teutonia Avenue from Nash Street to Atkinson Avenue, and along Eighth Avenue from Oklahoma Avenue to Ohio Avenue.

Double tracking of Downer Avenue from Edgewood Avenue to East Capitol Drive, and of Atkinson Avenue from 27th Street to 32d Street.

Improvement of service on the Eighth-Muskego and North Avenue lines by means of electrically heated one-man safety cars.

Rebuilding of the upper portions of the Wells Street railway viaduct.

In addition, the company completed an extensive program of reconstructing tracks and paying track zones in various

INCOME ACCOUNT OF THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

Gross Earnings	1927	1926
Operating revenues Non-operating revenues	\$27,157,902 349,648	\$26,219,754 335,348
Operating Expenses:	\$27,507,550	\$26,555,102
Operating expenses and maintenance Depreciation (reserve	\$16,053,184	\$15,369,656
credit) Taxes	2,031,590 2,543,638	2,043,191 2,283,191
	\$20,628,413	\$19,696,039
Gross income	\$6,879,136	\$6,859,062
unfunded debt Interest on finded and	\$2,305,744	\$2,266,754
reserve balancea Interest on other re-	558,402	521,979
serves	48,084	44,630
Net income	\$2,912,231 \$3,966,905	\$2,833,364 \$4,025,698

parts of the city of Milwaukee and suburbs.

An undertaking which commanded the attention of the transportation utility was the completion of another rapid transit line providing more rapid suburban and interurban service on the Burlington and East Troy lines. The service was started by the company on June 20 last year.

The faster service was made possible by utilizing a cutoff extending from West Junction on the Watertown rapid transit line to the East Troy Line at Ninety-third and National Avenues. The cutoff is barely a mile long, but its strategic location together with the improved rapid transit equipment, and the elimination of operation through busy, heavily traveled city streets, have made possible a considerable saving in the running time. Because of this line, faster and more frequent connecting motor coach service to Lake Geneva, Beloit and Janesville was also made possible.

TEN NEW CITY CARS

In addition to the forty new cars purchased late in 1926 and placed in service during 1927, ten new city cars were purchased in 1927. These cars are to be used on the State Street line, recently converted to one-man car operation. Innovations in these new cars are genuine leather upholstered seats and greater seating capacity. There are semi-indirect light fixtures, electric heaters, automatic treadle exits, concealed air-control pipes and the latest safety devices, also.

At its Cold Spring shops, the company constructed nineteen de luxe rail-way coaches for rapid transit service. It purchased also, two large street-car type buses and a number of smaller buses.

The Transportation Training Building was dedicated and put to use during the year. Here prospective trainmen, bus operators and maintenance men are taught their new jobs. In addition to class rooms for "academic" instruction there are "laboratories" in which new employees gain actual experience with the vehicles they will later operate or repair.

An attractive interurban railway and motor bus terminal was built at Watertown to accommodate the growing popularity of the rapid transit line between Milwaukee and Watertown, with connecting motor coach services to Madison, Janesville and Beaver Dam. The terminal provides commodious shelter. heated waiting rooms and ticket offices and ample facilities for handling baggage and checking of parcels. Transfer between cars and motor coaches is entirely under shelter.

The relations between the employees and the company continue to be satisfactory. The Employees' Mutual Benefit Association now has 6,415 members.

Of special interest to the association was the completion and dedication of its new lodge hall in the Public Service

Building.

This association continues to be a very important factor in establishing homes for the employees and their families. Since its inception in April, 1914, the association has provided upwards of \$12,793,651 for this purpose. More than 80 per cent of all married, permanent employees own their homes.

During the year \$5,378,300 of 6 per cent preferred stock was sold through the company's own securities department, and was distributed widely to customers in the service area. The amount of outstanding 7 per cent preferred stock was increased \$268,900 by completion of payments by customers purchasing on the installment plan. North American Edison Company, owner of the entire outstanding common stock of the company, purchased \$2,000,000 of additional common stock to provide part of the funds required for additions and extensions to the company's properties.

The increase in funded debt resulted

The increase in funded debt resulted from the issue of \$2,500,000 of refunding and first mortgage 5 per cent bonds, series due 1967. The amount of refunding and first mortgage 5 per cent bonds, Series B, increased \$2,377,000, due to the issue of such bonds in exchange for outstanding general and refunding mortgage 5 per cent bonds of equal amount.

Utility Bonds Recommended by New York Legislature

Interest was aroused in the financial district recently over the favorable report made by the New York legislative committee on the proposal to extend the list of bonds legal for savings banks and trust companies of the state. It is proposed to extend the list to include a certain proportion of public utility bonds, equipment trust obligations, and certain other changes in the present law are recommended.

In part the report said:

Equipment trust obligations are also deemed to be obligations of such high character that they may safely be recommended for savings bank investment. They cover rolling stock and equipment necessary to the operation of the railroads, which insures that such obligations will be met even though the railroad issuing them should itself become financially involved. It is proposed to admit to the legal list only those equipment trust obligations which are obligations of railroads, the bonds of which are now legal. They must be a first lien on rolling stock, shall not exceed in amount 80 per cent of the cost of such equipment and shall be payable in installments and over a period of not to exceed fifteen years with proper provisions for upkeep, replacement, payment of taxes and other charges.

Bills carrying out the recommendations in the report will be introduced shortly by the committee. Last year this legislation was handled by Assemblyman Willis Sargent of Syracuse. Objections to the proposal from upstate sources are that it would put

savings banks in competition with trust companies and would make it difficult for home builders of ordinary means to borrow money from savings banks on mortgages. The contention is that the savings bank deposits would be tied up in public utility securities.

Unification Agreement in District of Columbia

A unification agreement has been signed by the Capital Traction Company, the Washington Railway & Electric Company, and Harley P. Wilson, the owner of 21,237 shares of the stock of the Washington Rapid Transit Company. It is proposed to create a new company to be known as the Capital Transit Company which is to operate the street railways and bus lines which the three companes now are operating in the District of Columbia and near-by regions. The plan for combining these operations must be approved by the Public Service Commission and by The agreement specifies, Congress. however, that each party to the contract is to be restored to complete liberty of action if the plan is not accepted on or before June 1, 1929.

The new company will take over all of the property and outstanding securities of the Capital Traction Company, the 21,237 shares of the Washington Rapid Transit Company and the street railway portion of the business of the Washington Railway & Electric Company. The power business of the company will be continued as a separate entity, but the agreement provides that power is to be furnished the new company at reasonable rates. Initially authorized capital of the new company is to be comprised of 300,000 shares of preferred stock of the par value of \$100 per share and 300,000 shares of common stock to have a par value of \$100 per share.

This agreement provides for the climination of the requirement that crossing policemen be paid by the street railway operators. Under the agreement the new company is also to be relieved of the cost of paving streets between its rails.

Operation in Colorado Springs to Continue

The receipts of the Colorado Springs & Interurban Railway, Colorado Springs. Col., are such as to lend hope that with the present economical management, there will be no need to discontinue operation. Some of the heaviest losing lines have been discontinued and in some places buses have been installed, so that operation in 1928 appears assured.

Some time ago the company suggested that the city purchase the railway system and offered it for \$500,000, 50 per cent to be paid the company in city bonds. After deliberating the matter for some time the City Council rejected the proposal.

Agreement on B.-M. T. Acquisition Practically Reached

An agreement with representatives of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., Samuel Untermyer, special counsel for the Transit Commission, and John H. Delaney, chairman Board of Transportation, was recently reached practically on all points relating to the acquisition of certain railway property by the city except as to the price to be paid. A bill is being drafted for submission to the Legislature for creation of a transit authority to take over the B.-M. T. lines. The city plans seizure of the Interborough Rapid Transit Company by default under Contract 3 if the company advances fares to 7 cents. Agreement with Manhattan Railway stockholders will be attempted by the city whereby elevated lines would be turned over to the city for operation with the new municipal subway system if the Interborough should be obtained by default.

Surrender of Franchise in Marshall, Texas

The East Texas Public Service Company, subsidiary of the American Public Service Company, which has held the franchise for railway operation in Marshall, Tex., has reached an agreement with the city authorities under which the franchise is to be surrendered to the The company is to pay the city \$12,000, in return for which it is to be relieved of all further obligation in the operation of street cars, and will also be relieved of the responsibility of removing the car tracks from the streets. This agreement marks the end of the operation of street cars in Marshall. Buses were accordingly operated for some time, but a few months ago an-nouncement was made by the company operating them that the service would be discontinued as it was being operated at a loss.

Brief Filed for Dismissal of City Utilities Company

City Counselor J. T. Muench of St. Louis, Mo., filed with the Missouri Public Service Commission at Jefferson City on Feb. 9 a brief and argument in support of the city's application for a dismissal of the petition of the City Utilities Company of Delaware to acquire and hold 25,000 shares of the preferred, series A, and 170,000 shares of the common stock of the St. Louis Public Service Company. A state law prohibits a foreign corporation from holding more than 10 per cent of the stock of a public utility without the permission of the Public Service Commission. Counselor Muench contends that the Delaware company has failed to obtain a Missouri license and therefore has no legal status in the state, being outside the pale of the commission, which cannot legally entertain the application.

First Dividends to Mitten Bank Securities Holders

Mitten Bank Securities Corporation, Philadelphia, on Feb. 15 paid an initial dividend for the five months period ended Dec. 31, 1927, at the rate of 5 per cent per annum (2.0833 per cent) on the paid-in value of the part-paid common stock of the corporation.

At the same time the company paid an initial dividend for the five months period ended Dec. 31, 1927, at the rate of 6 per cent per annum (2.50 per cent), and an additional dividend at the rate of 1 per cent per annum (0.4167 per cent), the total dividend for the five months period being at the rate of 7 per cent per annum (2.9167 per cent) on the paid-in value of the part paid preferred stock.

Illinois Traction Inter-Company Deal

The Illinois Traction, Inc., has transferred to the Illinois Power & Light Corporation all its properties devoted to the generation and transmission of electrical energy in compliance with the recent decision to centralize all power units with the Illinois Power & Light Corporation, leaving the Traction system in control of transportation activities only. The entire deal is an intercompany transaction. Under the new plan the Illinois Traction has transferred titles to substations in a score of points along its routes with the new lessee authorized to reconstruct, enlarge and replace with steel towers all transmission lines on its right-of-way. All meters and marketing equipment for the sale of current are transferred, the Traction company having furnished power for industries along its line. The Traction line assumes bonds and deeds of trust of the Illinois Power & Light Corporation against the St. Louis, Springfield & Peoria Railroad and other lines involved in a recent merger of Illinois Traction and its subsidiaries. The power house in Peoria is one of the largest units included in the deal.

Meetings on Hocker Rejuvenation

Approximately 400 persons attended a meeting Feb. 2, at Shawnee, Kan., to discuss plans for financing a new company to purchase and resume service on the Hocker line, the defunct Kansas City, Lawrence & Topeka Electric Railroad, which formerly operated between Kansas City and Rose Hill, Kans.

Committees were appointed Feb. 6 to canvass in Monrovia, Rose Hill, and Shawnee for stock subscriptions. The committees will meet in the Shawnee State Bank later to report progress. Another community mass meeting was held in Merriam, Kan., on Feb. 4, to present the project.

W. K. Paul, manager of the line before it was sold to the Sonken-Galamba Corporation, outlined a plan

whereby a new company may be formed if \$10,000 in 7 per cent preferred stock is purchased by patrons of the line. When this stock shall have been subscribed the Sonken-Galamba Corporation has agreed to purchase \$16,000 in bonds and the Kansas City Public Service Company \$15,000 in bonds.

Financial Structure in Fort Wayne to Be Simplified

Plans for the simplification of the capital structure of the Indiana Service Corporation, Fort Wayne, Ind., involve the retirement of approximately \$4,800,000 in bonds. Provision has been made for a new mortgage under which \$5,000,000 of 5 per cent first lien and refunding mortgage bonds, Series A, due on Feb. 1, 1963, have been issued and sold to Halsey, Stuart & Company, New York and Chicago.

The new capital structure of the corporation will consist of the first and refunding bonds, which now become first mortgage bonds, totaling \$7,566,500, the new series of \$5,000,000 first lien and refunding 5 per cent bonds, and \$145,000 of non-callable underlying divisional bonds which are gradually being exchanged for an equal amount of first mortgage bonds on deposit with the trustees for this purpose.

Changes in Buffalo Financial Structure Are Sought

Stockholders of the International Railway, Buffalo, N. Y., will be asked at a special meeting called for Feb. 20 to approve the issuance of \$2,000,000 preferred stock and no par value common stock in exchange for the common stock of \$100 par value. Bernard J. Yungbluth, president of the International, says this change is desirable to improve the company's credit position and strengthen its financial structure.

Substitution of no par value stock for \$100 par value common now outstanding and the resulting changes in the balance sheet of the railway, have been approved by the Public Service Commission. Application for approval of the proposed issue of preferred stock will be made to the commission concurrently with authorization by the International Railway stockholders.

Mr. Yungbluth said that conditions making these changes desirable had their inception in 1912, when the company mortgaged its property. At that time, according to President Yungbluth, the Public Service Commission ordered the International Railway, to set up on its books an item of \$12,651,500 as tangible capital to be amortized over a period of years. Of this amount approximately \$4,000,000 has been written off. The company also is carrying on the asset side of its balance sheet an item of \$6,000,000 listed as strike expense which should be written off over a period of years and which the present proposed financial plan will permit to be written off at once.

Part of Seattle Loan to Meet Tax

Part of a recent loan of \$550,000 from the light department to the Seattle Municipal Railway, Seattle, Wash., will be used to make a first payment on the 1919 railway tax if a bill introduced in the City Council is adopted. The measure provides that the city pay \$115,000 next May. The money will go to the Puget Sound Power & Light Company. The total 1919 railway tax was \$401,017. Under an agreement, the city was to pay three-fourths, and the company one-fourth. Both the company and the city fought the tax and carried an appeal to the United States Supreme Court, where the tax was finally upheld. As the judgment was levied against the company, it paid the tax, which, with interest, came to \$655,279.

The company then sought to collect three-fourths of the amount of the tax from the city. More court action ensued. Judgment finally was returned in favor of the company. Since the financial condition of the municipal railway was precarious the City Council obtained an agreement with the power company to pay the tax money in five installments beginning next May. Councilmen had this tax debt in mind recently when they passed an ordinance loaning \$550,000 to the railway from the light department.

Receivers for Michigan Property

The Southern Michigan Railway, operating an interurban service between South Bend, Ind., and Benton Harbor, Mich., passed into the hands of receivers in the federal district court of Grand Rapids on Feb. 3, when suit was brought by the Harris Trust & Savings Bank, Chicago, to foreclose a mortgage for \$750,000, of which \$536,000 with interest has been due and unpaid since Oct. 1 last. Haddon McLean, of the Harris Trust & Savings Bank, and the Michigan Trust Company were appointed receivers and trustees by Federal Judge Fred M. Raymond.

The property will be operated by the Chicago, South Bend & Northern Indiana Railway, owner of the common stock. Through the lines of the Northern Indiana Company it has physical connections with a number of electric railways radiating from South Bend. The Chicago, South Bend & Northern Indiana Railway was placed in the hands of R. R. Smith, formerly general manager, as receiver.

Taxes Paid in St. Louis

Taxes to the amount of \$2,065,489 were paid by the St. Louis Public Service Company, St. Louis, Mo., to the city, county and state during 1927. On Feb. 2 the company paid the city mill tax for the last quarter of 1927 amounting to \$62,698.

Personal Items

J. J. Schweitzer Promoted in Cincinnati

John J. Schweitzer has been named assistant superintendent of shops and equipment of the Cincinnati Street Railway, Cincinnati, Ohio, and will be actively in charge of the work in the large new shops which the company is building in Winton Place, a suburb. When a boy he observed the electrification of Cincinnati cable cars. At the age of 17 he entered the employ of the company in Cincinnati. He became foreman of the armature department of the Cincinnati Car Company in 1905, a foreman of the Cincinnati Traction Company in 1908, and a superintendent of that company in 1917.

Change in Offices in Oklahoma City

At the recent election of officers of the Oklahoma Railway, Oklahoma City, Okla., G. A. Nichols was elected vicepresident and William Mee, president of the Security National Bank, was elected treasurer. The vice-presidency has been vacant for several months, but Miss Reba Zimmerman had been holding the post of treasurer, and may continue to handle the detail of the treasurer's office.

H. O. Crews Supervisor of Public Relations

Halbert O. Crews, supervisor of publicity for the Chicago Surface Lines, has been made supervisor of public relations. All publicity, advertising, public speaking and similar work is under his direction.

H. U. Wallace in New York

H. U. Wallace, former general manager of the Department of Street Railways at Detroit, Mich., is now engaged as a consultant, with offices in New York. He will handle operating surveys, financial reports, appraisals, reorganization and management detail in the bus, truck and railway fields.

The work which will come under Mr. Wallace's personal supervision will have the benefit of an enriched background in the railway field and the deft handling of a capable manager. Thirty years of engineering and railroad experience he brought to Detroit when in June, 1925, he took over the management of the Detroit municipal property. He had previously served with the Knoxville Power & Light Company, the Illinois Central, the Chicago, Lake Shore & South Bend Railway and the Fort Podge Per Mineral way and the Fort Dodge, Des Moines

tions cover only part of his active career in the fields of engineering and management

Colonel Wallace was born in Rock Island, Ill., in 1872. He was graduated from Purdue University. During the World War he was commissioned as major of engineers and assigned to the construction division as supervising construction officer of a large number of important ordnance plants. The career of Mr. Wallace has been reviewed at length previously in the ELECTRIC RAILWAY JOURNAL.

C.E.R.A. Headed by Detroit United Official

W. S. Rodger, general traffic manager of the Detroit United Lines, Highland Park, Mich., is the new president of the Central Electric Railway Association. All his business life Mr. Rod-



W. S. Rodger

ger has been connected with railways in the Central West, first in steam railroad work and since 1916 with the Detroit United.

The Detroit suburban and interurban system furnished a fertile field for a man of his talents, since its service approximated in character that of the steam lines with which he had long heen associated. This was true before the lines of the company in Detroit passed to the ownership of the city, but it has been particularly true since that time. The need has grown for intensive operation of the property under the direction of the receiver, and in the work of stimulating business and in mechandising the service Mr. Rodger has played his part well.

Mr. Rodger was educated in the public schools of Chicago. He entered steam railroad work in the operating department of the Michigan Central Railroad in that city, went from Chicago to Joliet in the same service but returned to Chicago as traveling freight agent. Thence he went to Toledo as general agent in the traffic department & Southern Railway. And these affilia- of the Michigan Central Railroad, and

from that post was advanced to assistant of the general manager at Detroit. On Aug. 1, 1916, he resigned from the Michigan Central to accept the post with the Detroit United Lines which he now occupies.

Robert Jagoe Advanced in Bridgeport

Robert Jagoe has been appointed superintendent of transportation of the Bridgeport lines of the Connecticut Company. In this capacity he succeeds F. L. Kibling, who was recently made general manager of the Bridgeport division.

Mr. Jagoe joined the Bridgeport Traction Company in 1895. Three years later he became inspector, serving in this capacity with the Bridgeport Traction Company, the Connecticut Railway & Lighting Company and the Connecticut Company. In 1912 he was made chief motorman and has served in that capacity since. Mr. Jagoe is succeeded as chief motorman by Wilfred Norman, who has been starter since 1914.

Obituary

JOHN H. TRUETT, former safety director and former chairman of the safety committee of the United Railways & Electric Company, Baltimore, Md., died on Feb. 5. Mr. Truett took over safety work in Baltimore in July, 1919, and resigned in 1925 to accept the position of director of the Baltimore Safety Council. During the World War Mr. Truett served overseas as a

battalion adjutant. He was 47 years old. William T. Gunnison, chairman of the New Hampshire Public Service Commission, died recently. Mr. Gunnison had practiced law in Rochester since his graduation from the Harvard Law School in 1895 and was a law partner of former Gov. Samuel D. Felker. He was born in Greenville, Miss., in 1869 and attended Phillips Exeter Academy and Dartmouth College. At one time he was judge of the Municipal Court in Rochester.

ANGELO VANCE FAWCETT, four times mayor of Tacoma, Wash., died there on Jan. 22, at the age of 81 years. During his entire political life Mr. Fawcett opposed the utilities, even going so far during his last term in office as to encourage an extensive use of jitneys to compete with the railway lines of the Tacoma Railway & Power Company. He finally went down to political defeat in a campaign in which the voters were convinced that his tactics were only hampering Tacoma's growth.

O. M. CARTER, one of the organizers in the building of the first electric railway in Houston, Tex., died on Jan. 6. During his 38 years in Houston he was active in public utility and civic improvement projects.

Manufactures and the Markets

Who Pays the Cost of Price Cutting?

A frank discussion of the warfare now being waged between the purchasing agents and the sellers in this buyers' market

By EARL WHITEHORNE Commercial Editor "Electrical World"

WITHIN the memory of this generation there has never been a time when business men were talking more about the ethics and the economics of price cutting. It is an engrossing subject of conservation in the electrical industry right now. It concerns the power companies because they are large buyers. It concerns the electrical manufacturers because they are selling to these large buyers. It concerns them in the same way that the same conditions are involving other large buyers and sellers in numerous other industries. But the fact that these conditions are general does not make them any less particularly a problem which the electrical industry must face in its own field and work out for itself.

IN A BUYERS' MARKET

We are of course in a buyers' market. There is excess capacity and overproduction in manufactured products and an intense competition for orders. But that is not all. We have had other periods when the buyer was in the saddle, riding the salesman whip and spur, just as we have had sellers' markets, when demand exceeds supply and the pressure has been upon the purchaser-during the war, for instance. And whereas then the salesman was playing one buyer against another for a better price, the purchasing agent today is juggling one seller against another for a lower figure. It is not unnatural. The purchasing agent feels that it is now his time to be the wolf. It is his night to howl. But times have changed and what was once considered a fair game of bartering has come to be a matter of the economics of an industry.

There has been much progress in the thinking of American business. pack peddler and the patent medicine man have gone their way with their wooden nutmegs and fake nostrums. The days of barter in the village store have given place to a one-price policy in retail trade. Modern business ethics have purged the manufacturing field of many practices that once were looked upon as quite legitimate but now are recognized as unfair either to the customer or the competitor. And now a new advance in the evolutionary process has introduced another idea—the responsibility of business men to protect the economic health of the industry in which they are engaged.

In other words the growth of American industry has brought with it an extremely complex inter-relationship among manufacturers and between buyers and sellers throughout the land. Specialized production has developed a tremendous volume of inter-industry trade in materials, equipment and services, and also large concentrations of capital and industry have resulted in a degree of interdependence between the buyer and the seller in such an industry as ours as has never been known before. And the present discussion of the prevalence of price cutting by manufacturers and profiteering by large pur-chasers has to deal with these new conditions.

Obviously it is poor business to be a party to a transaction in which either side is going to lose money. That is just common sense. For it usually costs more to win a new customer than the profit on the first order he gives. It is the continuing business from the account that pays, and it costs money also for a large buyer to take on a new sup-

SOME EXPERIENCES IN PRICE CUTTING

The purchasing agents of large buyers are being accused of profiteering. The complaining manufacturers are being charged with lack of price courage. What is it all about?

In this article Mr. White-horne arrays the major factors in the situation. There will follow a further discussion of "Some Experiences in Price Cutting" in which the methods that are at present demoralizing the market for electrical apparatus will be described. The editors will welcome a frank expression from our readers on this important and much disputed issue.

plier and establish an understanding of special needs and a dependable service. Usually it costs more than is gained by changing to another line just to seize a slight price advantage on the initial order—too often offered as a bait.

But there is more to it than that today. For so vast is the flow of goods and so greatly is the modern buyer sustained in his own business by his suppliers, that a large industrial organization has come to be vitally concerned with the prosperity of the other organizations from which it draws. Put a manufac-turer out of business by rendering it impossible for him to make money and you must look elsewhere for your next shipment of whatever it is you need. Let him live and he will continue to help you make more money. And that is precisely the philosophy that has dominated in those much heralded cases where a large buyer has examined into a seller's costs and refused to accept cut prices that netted him a loss, knowing that either this seller must hereafter skimp on quality or service or ultimately go to the wall-unless the price level is restored.

ENGINEERING DEVELOPMENT SPONSORED BY MANUFACTURERS

In the electrical industry where an expensive engineering type of equipment is involved the buyer also relies upon the manufacturer for another vital resource. He looks to the manufacturer to advance the art, to conduct expensive research, to carry forward the progress of engineering development. And if the manufacturer is denied profits that are adequate to finance the cost of this, then this will gradually cease and the industry must sacrifice one of its most priceless assets, unless the buyer assumes the burden.

Samuel Insull stated it well for electrical men, in a much quoted address in Chicago not so long ago. He said:

You men who are in branches of the business other than central station business—you have problems of your own. But the interdependence of the industry makes your problems ours, as it makes our problems yours. Central station development creates the market for you and keeps it expanding. Development on your side assists our efficiency and facilitates use of our product. If competition in the sale of turbo-

and threaten the quality or the rate of development; if too narrow margins restrict the wholesaler's ability to carry adequate stocks, supply sales service and extend credit to the retailer; if the keenness of competition between contractors impairs the adequacy or quality of wiring; if construction is hampered or not properly remunerated on account of policies in other branches of the business—if any of these things happen, the central station companies, which use those materials and services, finally suffer the most.

And last of all the paramount responsibility, imposed upon all of us by our common interests, is to see to it that no obstacles are placed in the way of general electrical development—a development that is not yet nearly completed but has already done so much to make our country the envy of all

the world.

Coming down to cases—Just what is the situation in the electrical industry?

Two things are happening:

1. Purchasing agents of large buyers are rigorously applying the thumbscrews to the manufacturers' salesmen and beating down price levels by ingenious methods of induced competition.

2. Manufacturers in their eagerness for volume are weakly submitting to this pressure and cutting prices to get

orders that net a loss and demoralize their market.

The first reaction is to just say: "Well, under the circumstances the purchasing agents are smart and the manufacturers are not. Why worry?" But when you look ahead and ask yourself what the consequences may well be within this highly interdependent community of business interests if this condition should continue very long, you realize that in the end the buyer would suffer with the seller, and the entire industry would be the loser by it all. Large scale profiteering by purchasers, widespread price cutting by manufacturers in this day and age soon become a common problem.

What is to be done? It would seem that the burden of reform would rest upon the manufacturers who possess the right to accept an order or decline it as they wish. But as every manufacturer knows, the demand for volume is a remorseless pressure upon the sales department that must feed orders into the hungry hopper of a modern factory. And since the Sherman law forbids competing manufacturers to organize for mutual protection against the snares and pitfalls of a buyer's market, each one must take his chances in the open strife, and the price that can be charged depends upon the level of the market for competing lines. Let one sales manager weaken in the face of a persistent pricesqueezer and let a second fall in line and no other bidder can hope to hold to his figure and secure the business.

Apparently there remains but one legal and practical defense to which the manufacturer may have recourse. That is the organizing of industry opinion, to correct uneconomic practices and improve the standard of executive policy among both the buyers and the sellers. In other words, he must broaden the vision of the purchasing agent and stiffen the spinal structure of the sales

manager.

Too Much Secrecy

The seat of the present trouble, it would appear, lies in the old tradition of the secrecy of bids, for here is the keenest weapon that the buyer is employing at the moment. A group of manufacturers are invited to submit bids on equipment to be purchased. The bids equipment to be purchased. The bids are in. The salesmen call. The purchasing agent thereupon proceeds privately to play each man against the others, telling each that he is high, inciting each to telephone the factory, whipsawing them with fear and hope until the last price cut has been exacted and the last unhappy concession wrested from the profit margin on the goods. Too often he who was the low man at

THREE

RECOMMENDATIONS

- 1. That bids on standard listed apparatus should be offered for examination by any bidder who is called back and asked for a reduction of his price.
- 2. That salesmen should demand this as evidence of good faith on the part of the buyer whenever asked to cui a price after bids are in.
- 3. That post mortems on competitive bids should be made standard practice among all manufacturers so that losers may understand their lost business.

the outset is the low man at the end but minus profit. Too often also the order was all the time intended for him for some good consideration of the quality or service offered, in return for which he has been mulcted of his company's earning power on that sale. Because of the traditional sanctity of bids, he has been unable to demand a showdown when the bids are in, a chance to see whose price is really high. For there are lying purchasing agents as well as lying salesmen, and the temptation to play tricks with truth is sometimes great in buying.

Clearly, therefore, there are three things to be done as an approach to a

remedy:

1. Secrecy should be eliminated on bids for standard listed apparatus. Bids are published on government orders. Bids to private purchasers should be open to examination by any manufac-turer who is called back and asked for a revision of his price. At present it is not supposed to be morally right to show a bid to a competitor. Where the bid entails a large element of engineering or other variables this secrecy will undoubtedly continue. But on standard listed apparatus—and this covers the major volume of the sales of industrythe buyer should show the bids when asking any bidder to reduce his price.

2. Salesmen should demand this frank showdown-whenever called upon to cut a price after the bids are in. He should expect it as an evidence of good faith on the part of the buyer. Manufacturers should refuse to consider a concession

without this evidence.

3. The holding of post mortems on competitive bids should be made standard practice among all electrical manufacturers, so that losers may analyze all bids and understand their lost business. This is lawful and already is being done to some extent, the exchange of bids being made by the bidders. The

National Electrical Manufacturers Association is actively promoting this idea and serving as clearing house for its members. The practice should be general.

Of course, this would not end all cutting of prices. It would simply bring the practice out into the open and improve its morals. It would be a step toward an eventual one-price system.

But the seller should not be made to fight for this reform unaided. Purchasing agents individually and as nationally organized should also become the exponents of this idea. It is another step to be taken in the de-bunking of business, the banishing of deceit and trickery from trade. In this era of economic intelligence the gentle art of profiteering by purchasers should be laid away in shrouds along with the wooden nutmeg and that once popular commercial slogan-caveat emptor!

For men do not buy for price alone. Price is important. But other factors are equally important because they themselves constitute the value, for which the price is paid. The chief concern of the buyer should be to see that he obtains a value proportionate with the price. The chief concern of the seller should be to see that he obtains a price commensurate with the value. And these two ideals are not antagonis-They go together like the well known words—E pluribus unum—to use more Latin.

Who pays the cost of price cutting, then? Both the buyer and the seller pay it. And in the end the entire industry suffers.

Track and Terminal Work Planned by C., A. & E.

The Chicago, Aurora & Elgin Rail-road, Aurora, Ill., has been granted authority to relocate its tracks in that city, along the river bank from New York Street north to the point where the track turns into Broadway. The Dellinburg block at the intersection of Broadway and New York Street is to be remodeled and used as a new terminal. It is reported that the relocation will relieve much of the Broadway traffic congestion through removal of the third rail cars from that thoroughfare. Col. Edward Blair, general manager of the traction line, estimates that the new construction work will require eight months and will be started as soon as final rights-of-way are obtained.

Westinghouse Manufacturing **Executives Promoted**

Announcement has been made by J. M. Hipple, works manager of the East Pittsburgh works, of the appointment of E. C. Brandt and F. J. Shiring as assistant works managers, and of J. E. Webster as chief plant engineer.

Changes simultaneously announced by E. R. Norris, general works manager, are the appointment of A. E. Kaiser as director of production for all works and S. C. Hoey as works manager of the Homewood renewal parts works.

London Plans Extensive Car Overhaul

Further particulars of the program of the London Underground electric group of railways, costing \$12,500,000, are now available. The work intended to be carried out is expected to take about two years to finish and to include a complete overhaul and renewal of the old rolling stock and equipment, so as to bring it up to the standard of efficiency represented by cars recently put in operation. Temporary shops for the purpose have been constructed at Feltham, and the existing shop at Acton has been considerably enlarged.

The new equipment to be purchased includes motors, control, door equipment and cars. The new cars on the ment and cars. tube railways will have pneumaticallyoperated doors, but the District cars will retain the present hand-operated doors.

Economic Situation to Be Surveyed by Hoover Committee

Secretary Hoover has announced the personnel of the committee which is to make a survey of recent economic changes in the United States as follows:

John J. Raskob, vice-president General Motors Corporation, New York; Owen D. Young, chairman General Electric Company, New York; Daniel Willard, president Baltimore & Ohio Railroad, Baltimore; A. W. Shaw, president A. W. Shaw Company, Chicago; Lewis E. Pierson, president United States Chamber of Commerce; William Green, president American Federation of Labor; John Lawrence, president New England Trade Council; Adolph C. Millert of the Federal Reserve Board; Max Mason, president University of Chicago; George Mc-

Fadden, Philadelphia; Louis J. Taber, master National Grange; Clarence National Grange; M. Wooley, chairman American Radiator Company, New York; Walter F. Brown, Assistant Secretary of Commerce, and Secretary Hoover, chairman of the committee.

The committee will meet in New York on Feb. 21, to start its inquiry in conjunction with the National Bureau

of Economic Research.

When he announced on Jan. 26 his determination to appoint such a committee, Secretary Hoover stated that the committee will "supervise a farreaching inquiry into the changes in economic currents in the country.'

Copper Prices Fairly Steady

Business has not been brisk in any of the metals, although the cut in lead

stimulated some buying.

After ruling at 6.50 cents for two and one-half months, the price of New York lead has been cut; tin continues its downward course; zinc has eased slightly; but copper prices are pretty well maintained, with "primary" pro-ducers firm at 14.125 cents. On the other hand, sales at various prices between 14.00 and 14.10 cents, have been made, the lowest being reached Feb. 15, when one lot was sold for 14 cents.

Last Friday, Feb. 10, the American Smelting & Refining Company cut its contract price from $6\frac{1}{2}$ cents, New York, at which level it had held since Dec. 1, to 6.35 cents. The St. Louis market has also weakened, lead having been sold on Feb. 14 and 15 at various prices between 6 and 6.15 cents.

Straits tin for prompt delivery sold Feb. 15 at 514 cents.

Dullness has pervaded the zinc mar-

ket and prices have softened. Metal was to be had Feb. 15 at as low as 5.575 cents.

Stark Electric Program Includes Three New Cars

The purchase of three new one-man interurban cars from the Cincinnati Car Company is the major item in the improvement program costing about \$70,-000 to be carried out by the Stark Electric Company, Alliance, Ohio. improvements are to be made to increase service between Alliance and Canton, and between Canton and Louisville, Ohio, the latter a distance of 5 miles.

Other work proposed is construction of three sidings and a loop between Canton and Louisville, and installing an automatic block signal system from Alliance to Canton. The new construction will cost about \$10,000 and the signal system about \$15,000, according to E. W. Sweezy, general manager of the company.

Two Cars for Fitchburg Road

An additional sales agreement between the Fitchburg & Leominster Street Railway, Fitchburg, Mass., and the Wason Manufacturing Company, Springfield, Mass., covering the purchase of two light-weight double-truck cars has been approved by the Massachusetts Department of Public Utilities.

ROLLING STOCK

FORT DODGE, DES MOINES & SOUTH-ERN TRANSPORTATION COMPANY, subsidiary of the Fort Dodge, Des Moines & Southern Railroad, Boone, Ia., has accepted delivery on two 27-passenger A.C.F. parlor coaches.

SHOPS AND BUILDINGS

BRITISH COLUMBIA ELECTRIC RAIL-WAY, Vancouver, B. C., it is reported, will expend \$70,000 in construction of two large substations as already planned, and plans are under way for several others. The two planned will be undertaken at once.

ADVERTISING LITERATURE

OHIO BRASS COMPANY, Mansfield, Ohio, is sending out in folder form the reprint of an article which appeared in the ELECTRIC RAILWAY JOURNAL for Dec. 17, 1927, entitled "Catenary with Unusual Pole Spacing Withstands Cyclone," by L. W. Birch, line material engineer of that company.

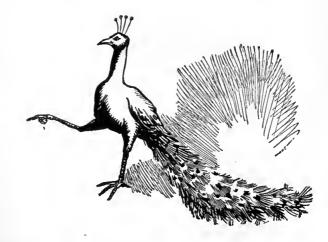
MITCHELL - RAND MANUFACTURING COMPANY, New York, is mailing a card directing attention to the advantages of its "E.B." Insulating Paint and "2098" black paint.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y., has issued a loose leaf folder, entitled C R 3110 drum controllers.

ELECTRIC RAILWAY MATERIAL PRICES-FEB. 14, 1928

Metals—New York		Paints, Putty and Glass-New Y	ork
Copper, electrolytic, cents per lb. Lead, cents per lb. Nickel, cents per lb. Zinc, cents per lb. Tin, Straits, cents per lb.	13.85 6.325 35.00 5.95 52.00	Linseed'oil'(5 bbl. lots), cents per lb White lead in oil (100 lb. keg), cents per lb. Turpentine (bbl. lots), per gal Putty, 100 lb. tins, cents per lb	\$0.65
Alaminum, 98 or 99 per cent, cents per lb	24.30	Wire-New York	
Babbitt metal, warehouse, cents per lb.: Commercial grade	61.00 31.50	Copper wire, cents per lb	16.125 5.30 16.50
Bituminous Coal		Paving Materials	
Franklin, Ill., screenings, Chicago	1.825 1.575 2.125	Paving stone, granite, 3 in.	\$150
Track Materials—Pittsburgh		N. Y., per ag. vd	\$2.70
Standard steel rails, gross ton	\$43.00	Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	51.06
cents per lb	2.75 2.25	carload lots	45.00
Angle bars, cents per lb. Rail belts and nuts, cents per lb.	2.75 3.90	per cu.yd	1.85
Steel bars, cents per lb Ties, white cak, Chicago, 6 in.x8 in.x8 ft	1.85	without bags	2.05 1.75
• • • • • • • • • • • • • • • • • • • •	\$1.70	Sand, cu.yd., f.o.b. N. Y	1.00
Hardware—Pittsburgh		Old Metals-New York and Ch	icago
Wire nails, base per keg. Sheet iron (24 gage), cents per lb	2.65 2.90	Heavy copper, cents per lb	11.875
Sheet iron, galvanized (24 gage), cents per lb.	3.65	Light copper, cents per lb	10.25 7.25
Galvanized barbed wire, cents per lb	3.35	Heavy yellow brass, cents per lb	3.50
Galvanized wire, ordinary, cents per lb	2.50	Lead, cents per lb. (heavy)	5, 25
Waste-New York		Steel car axles, Chicago, net ton	\$16.25
Waste, wool, cents per lb	16-20	Cast iron car wheels, Chicago, gross ton	14.25 15.50
Waste, cotton (100 lb, bale), cents per lb.:		Rails (short), Chicago, gross ton	19.50
White10 Colored	5-19.50 11-16	and heavier)	28.50 7.50
			

Your life is insured.



The majority of men insure their lives to provide for the well being of their beneficiaries.

Equally so, the majority of modern cars are equipped with

"Peacock" Staffless Brakes

Reg. U. S. Pat. Off.

protecting their owners with insurance against inroads upon net revenues and accident reserves due to failures of inferior hand-brakes. In pratice, test and experience, they have proved their merit beyond all argument or doubt. They pay for themselves.

May we send you the detailed facts and figures.



The Peacock Staffless

National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Canada

where and why they



BOSTON

Unit is increasingly recognized by transportation companies because of its fundamental operating economy---and the ultimate consideration is necessarily highstandard service at a profit.

MONTREAL

ALBANY

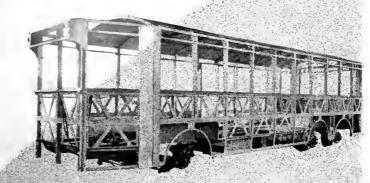
CLEVELAND



NEW YORK

bought versares

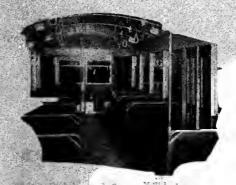
----since half a million miles of Every-Day Operation have shown that Versare Highway Units will consistently earn more net revenue----under diversified conditions and with a maintained minimum operating cost.



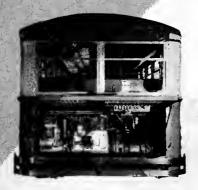
Duralumin unit girder construction....no chassis....Rigidity and strength that eliminates the question of overloading.

Versare Patent Equalizer..... equal shock distribution.... comfortable riders are frequent riders.





24 inch aisle at seat backs.... six foot six head room..... greater capacity and comfort.



Easy access power unit....less time in shop.....more earning hours on the road.

versare corporation

albany, n. y.



For the Operator with Limited Capital

Here is an economical standard city pay-enter bus offering every comfort and convenience to make passengers friendly and permanent riders.

Seats 29 passengers. Operated with unusually low cost, sturdily built and well capable of withstanding the punishment of day-in and day-out service.

The interior is cheerful and cozy; sides and interior roof trimmed with light weight imitation leather to match genuine leather seat upholstery; seats roomy and comfortable

with arm rests at aisles; backs scalloped for individual effect with rear of backs cutaway for better knee space. Windows clear and wide. Drapes or Pullman type Spring Roller curtains are optional at windows.

Notice the protective rails at sides. Mark also rails at windows to further prevent accidents.

May we have one of our representatives call and discuss your needs with you?

THE BENDER BODY COMPANY

W. 62nd St. & Denison

Cleveland, Ohio

BENDERBODIES



Model 15 (Street-car type) by International Harvester

One of Three Popular Styles

HE coach operator of today lays his plans with an eye to maximum activity with conservative investment. He wants economy coaches for medium loads, designed inside and out to please the fastidious rider, and scheduled to run with the dependable frequency that establishes routes with the public.

He finds on investigation that the coach he prefers is such a coach as

International Harvester builds and services. International Harvester pioneered in the development of motor coaches and the popular Model 15 is the fruit of that experience. Furnished in three styles—the Street-Car type [shown above], the Club Coach, and the Sedan Coach. To carry 15 to 17 passengers—the ideal capacity. Write for the Motor Coach Catalog.

INTERNATIONAL HARVESTER COMPANY

606 So. Michigan Ave.

OF AMERICA

Chicago, Illinois

The International Harvester automotive line also includes Speed Trucks of 1¼, 1½ and 2-ton, Heavy-Duty Trucks up to 5-ton, and McCormick-Deering Industrial Tractors.



Serviced through 160 Company-owned branches in the United States and Canada, and through many dealers. Service unexcelled — service always "around the corner."

INTERNATIONAL HARVESTER SIX-CYLINDER COACHES

The need for a tire that can stand up under the load at express speed has been filled by the General Heavy Express Special. Faster schedules are now possible without sacrificing the economy of long mileage.



-goes a long way to make friends

101 YEARS OF MANUFACTURING EXPERIENCE



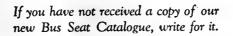
No. 327 C

Snow sweeper rattan and rattan car seat webbing may be ordered through any H-W sales office.

For New Cars or Replacement Use

Here is a good-looking, long-wearing, reversible seat that will help you reduce the equipment cost for new cars or for replacement improvements. The 327 C is fairly inexpensive, yet it embodies all the mechanical betterments of our higher priced seats. This modern style has a soft, comfortable spring back and a deep, single-spring, six-inch cushion. The reversing mechanism, made of malleable iron to withstand hard service, is positive and easy in action.

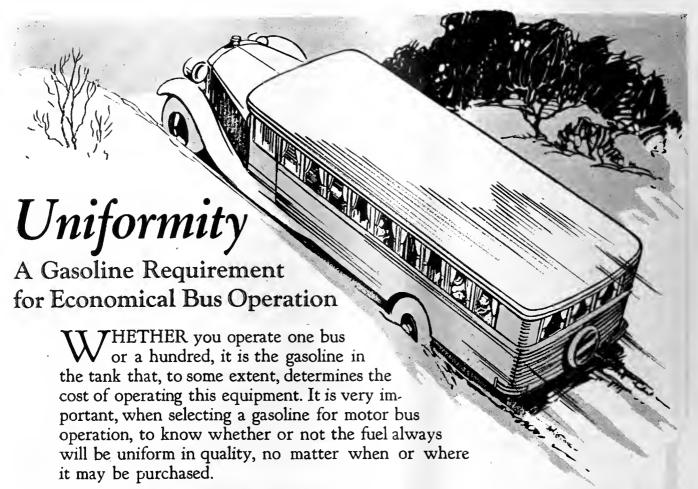
If you are interested in keeping equipment costs down to a minimum, here is a seat that you will appreciate. A note to the nearest representative, listed below, will bring an experienced man who will be glad to furnish complete details and specifications on the 327 C.







Heywood-Wakefield Co., Wakefield, Mass.; 516 West 34th St., New York, N. Y.;
439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San
Francisco, Cal. The G. F. Cotter Supply Co., Houston, Texas. F. N. Grigg,
630 Louisiana Ave., Washington, D. C. The Railway & Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal;
Winnipeg, Canada.



To approach anything like satisfactory performance with a gasoline of varying quality, it is necessary frequently to adjust the carburetor. Properly to make these adjustments requires more skill than the average bus driver possesses.

When the carburetor is not correctly set for the gasoline in the tank, loss of power, rapid carbon formation and excessive dilution of the crankcase oil often result.

RED CROWN Gasoline

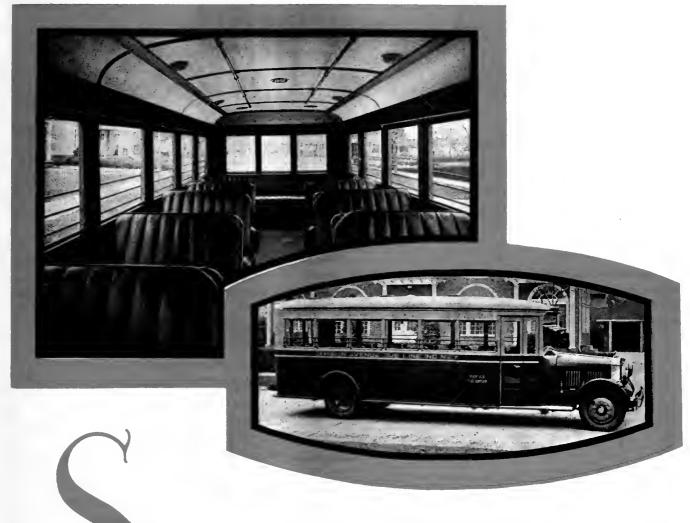
is refined with extreme care to insure uniform quality at all times. No matter when or where you purchase this remarkable motor fuel you are assured that the gasoline entering the tank is exactly of the same quality and dependability as that which has been driving your buses since the last fill. It is true economy to standardize on Red Crown Gasoline.

A decided improvement in the operation of your buses will be noticed when you begin using this gasoline. At the end of a year's time, you will observe that the bill for motor fuel is considerably less than formerly. Change to Red Crown today and satisfy yourself that the claims we make for this superior motor fuel are true.

STANDARD OIL COMPANY

(Indiana)

General Offices: 910 South Michigan Avenue Chicago, Illinois



treet Car Type Supreme

Luxury Economy Sturdiness Sturdiness Seating capacity of the street car type—comfort and luxury that approaches the parlor car.

This FitzJohn 25 Passenger Pay-Enter Street Car Type Body (mounted on an A. C. F. chassis) gives the acme of all superior qualities.

Strong—sturdy with the built-in feature in strength to stand the knock-about city service.

Beautiful with simple, correct lines outside—adequately luxurious finish inside.

This is a real job. Send for complete information.

FITZJOHN Manufacturing Co.

Exclusive Bus Body Builders MUSKEGON, MICH.

A thousand becomes a hundred

A CUT of 90 per cent in the number of different brushes used was accomplished by the Pittsburgh Coal Co., Library, Pa., with our assistance. This company now buys only 100 different styles, types and sizes, as against 1000. The latter figure was due to the fact that each electrician or superintendent on each mine working did his own ordering. This haphazard practice naturally gave results that were quite unsatisfactory.

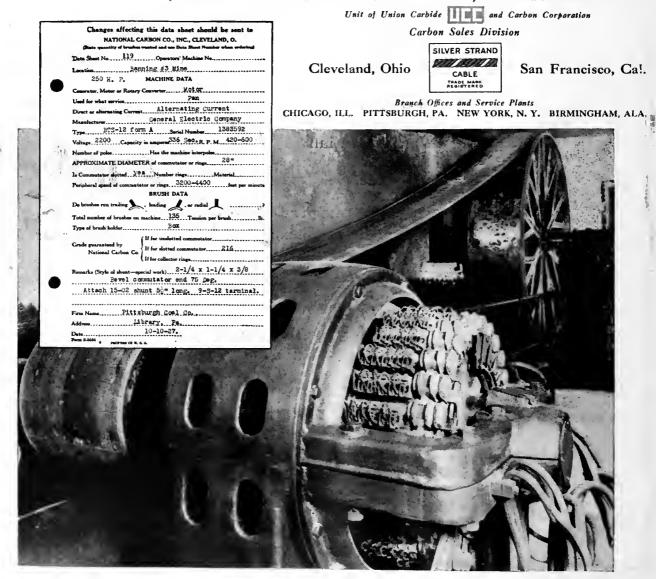
One of the National Carbon Company's sales engineers co-operated with a Pittsburgh coal engineer in making out an NCC data sheet for every brushusing machine, studying the exact requirements in

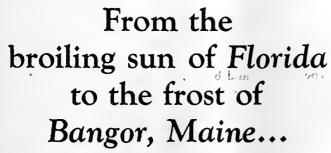
each case. Superior brushes were recommended where there was room for improvement. Unnecessary and unusual specifications were discarded. The thousand became a hundred, better machine operation was secured, complete control by the Pittsburgh engineers was assured, and swift, simple, error-proof brush orders made possible.

The same calibre of service that proved so valuable to the Pittsburgh Coal Co. is available freely to any brush user. Write, wire or phone, and our knowledge and experience will be placed at your disposal, through the installation of the Data Sheet System.



NATIONAL CARBON COMPANY, INC.





TAMPA on the south, Winnipeg on the north; west to San Francisco, and east to Bangor, Maine...in 1927, engineers in 152 cities were using and recommending Carey Elastite System of Track Insulation.

It's climate-proof, this remarkable protection. Climate-proof, and it outlives the track itself.

Carey Elastite System of Track Insulation consists of a durable, asphaltic compound substantially reenforced with asphalt-saturated fibre preformed under heavy pressure. Of course you will want to know more about this great traction improvement — about the lasting protection it affords electric traction lines. Write.

THE PHILIP CAREY CO.

Lockland, Cincinnati, Ohio





Tampo



The Horseless Carriage of '98 was a success — in '98

Past success is no argument for tomorrow. You know from accumulated experience that the successful policies of yesterday are soon made obsolete by the ever-changing demands of business.

For continued success you must have a dependable source of market information. You must keep abreast of developments in manufacturing methods. You must follow the trend of your field in every particular.

Imperative demand for this information has created the Business Papers, such as the one you are now reading. Their primary function is to gather the news of the industry which they cover and then to select and present that which is important, in such a way as to best serve you.

This paper, a member of the A.B.P., assures you reliable, pertinent news and tested ideas. It is pledged to consider first the interests of the subscriber and to maintain the highest standards of publishing practice. It fulfills this pledge as a requirement of A.B.P. membership.

Paralleling this news service you have the convenience of the business papers "market place." The products of industry truthfully displayed and described are brought to your attention.

This paper can render you an invaluable service. Read it regularly and gain full benefit from the information it carries.

THE ASSOCIATED BUSINESS PAPERS, INC. Executive Offices: 52 Vanderbilt Ave., New York, N.Y.

5.P.

An association of none but qualified publications reaching the principal fields of trade and industry.







The Car Upholstered in Velmo Mohair invites and holds Patronage

CHASE TOTALOS

Made by SANFORD MILLS, Sanford, Maine Selling Agents, L. C. CHASE & Co., BOSTON New York Detroit Chicago San Francisco





Improve the job with Acme Tapes

You can make a reputation for lasting repairs in your shop by winding Acme Varnished Tapes into them; and many a repair job will actually be better than the original. Nothing but the finest materials go into Acme Tapes, and they pass all A. S. T. M. tests with a generous margin.

For Safety, Use Acme Varnished Tape

Manufactured to Pass All Tests For:

DIELECTRIC STRENGTH DIELECTRIC CONSTANT DIELECTRIC LOSS INSULATION RESISTANCE POWER FACTOR FLEXIBILITY RESISTANCE TO TEAR TENSILE STRENGTH RESISTANCE TO OILS, ACIDS AND RESISTANCE TO IMPREGNATING COMPOUNDS

Acme Varnished Tapes are furnished in widths of ¾" and wider, and in rolls of continuous length without splices. Special widths and finishes supplied on order. Write for catalog 3-J for your files.

ACME WIRE **PRODUCTS**

THE ACME WIRE CO. Main Office and Plant, New Haven, Conn.

Branches: New York, 52 Vanderbilt Ave. Cleveland, Guardian Bldg. Chicago, 427 West Erie St.

10101010101010101010101010

NOW—An OHMER Register that Prints Stations by NAME!



NOW we have developed a Type 79 OHMER Ticket-Printing Register

especially for ticket offices. It prints the issuing station and destination by name. This enables each passenger to know that the ticket calls for the ride purchased. There's no chance of error. And the ticket also shows all the other details pertaining to the ride. Not a single item is omitted.

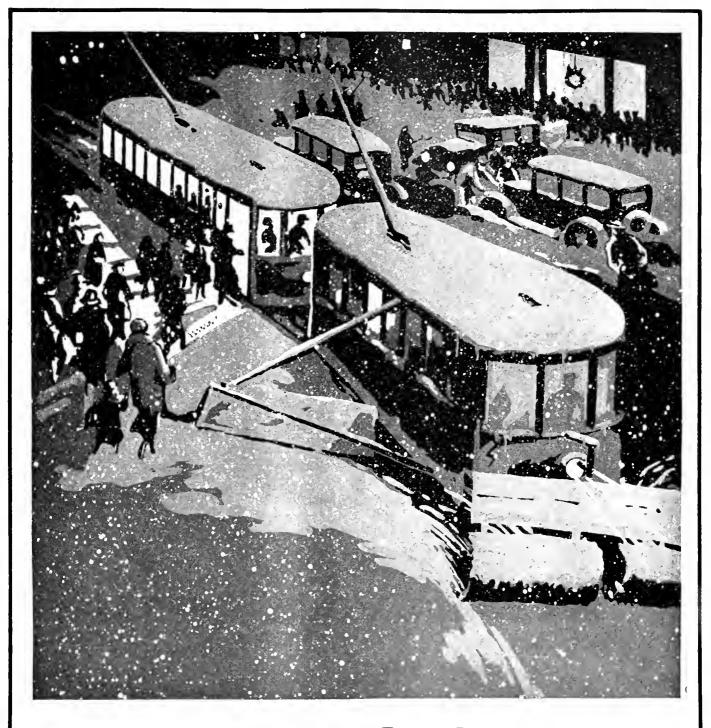
But that isn't all. A complete tabulated record of the data is printed on a tape locked in the register, which makes auditing easy and exact.

Also Models for Use in Cars and Buses

The Type 79 OHMER Register is also made in models that are adapted for use by the operators or conductors of cars and buses. The register can be mounted where wanted or carried by a shoulder strap. A fully printed ticket or receipt is issued for each fare, with a detailed duplicate locked in the register.

Ask for descriptive circulars. Learn how OHMER Registers pay for themselves time after time in the revenue they save and in eliminating the cost of preprinted tickets. Write or wire today.





SERVICE.. yesterday-today-tomorrow

Barron G. Collier Inc.

Candler Bldg.

New York

_SAVES the Company's Money and the Public Likes It

TITRIFIED brick continues to be the favorite material for paving the track area.

It is economical and durable; permits repairs to be made easily; does not "shove" or "roll."

The interests of both the street railway company and the public are best served with vitrified brick pavements.

> Send for complete information to National Paving Brick Manufacturers Association, 332 S. Michigan Avenue, Chicago.

VITRIFIED BRICK PAVEMENTS

FACE THE FUTURE-PAVE WITH BRICK

Right on your desk —just the data you want

Electric railway executives, engineers and operating men have long respected Richey's ELECTRIC RAIL-WAY HANDBOOK as the one great pocketbook of practice data, formulas and tables in the electric railway field.

The second edition of Richey covers the latest developments-describes new methods-records changes in theory and practice. It covers every phase of electric railway work from Roadbed and Track to Signals and Communication.



This widely known handbook is virtually an encyclopedia, on modern electric railway organization, administration and operation.

- Data on subjects which come up in everyday electric railway practice for constant use by the operating, constructing and designing engineer.
 Material of service to the non-technical manager or
- operator.

 (3) Reference material on electric railway practice for those who are specializing in other or allied fields.

Information every electric railway man needs—the latest and best methods—changes in practice and theory—that's the New Richey.

See your copy FREE Mail just this coupon

McGRAW = HILL

McGraw-Hitt Book Co., Inc., 370 Seventh Ave., New York, N. Y.
You may send me on 10 days' approval Richey's Electric Kallway Handhook, \$4.00 net. 1 agree to pay for the book or return it postpaid within 10 days of receipt.
S'gned
Addesse

Official Position

Name of Company..... (Books sent on approval to retail purchasers in the U.S. and Canada only.)

.....



For TRUCKS, MOTOR BUSSES, TAXIS

And a Complete Line for TRACTORS and TRAILERS

ANOTHER YEAR

1927 saw many more satisfied users of Shuler Fronts and our policy for 1928 will be to maintain the prestige gained by continuing to build—Front Axles of real merit and character.

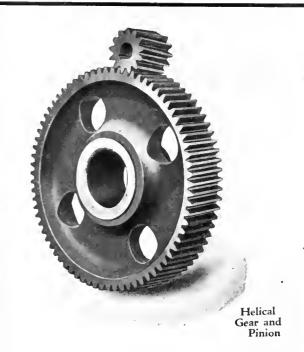
FRONT AXLES ONLY

Shuler Axle Co.

Incorporated

Louisville, Ky.

Member of Motor Truck Industries, Inc., of America



Noise and Good Will Don't Mix!

Gear noise has a definite effect on passenger good will. People do not enjoy riding on cars on which the gears youl and cry as if they were in agony. And with their increasing irritation at the screeching gears their good will takes wings.

Nuttall helical gears with their smooth quiet operation will eliminate this source of annoyance. Over 70,000 helical gears on the electric railways of the United States have proved this.

Send for our bulletin No. 52

R.D.NUTTALL COMPANY PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co.
District Offices are Sales Representatives
for Nuttall Electric Railway Products
Lyman Tube & Supply Co., Montreal, Toronto, Canada





COLUMBIA

Railway Supplies and Equipment

Machine and Sheet Metal Work

Forgings
Special Machinery
and Patterns

Grey Iron and Brass Castings

Armature and Field Coils.

The Columbia Machine Works and M. I. Co.

265 Chestnut St., corner Atlantic Ave.,

Brooklyn, New York



JOHNSON FARE COLLECTING SYSTEMS



Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to S% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.





Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.



Drip Points for Added Efficiency

They prevent creeping moleture and quickly drain the pettl-coat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our enginears are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company Muncie, Ind.

Est. 1848-lnc. 1870



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl Free-Winding Tension Spring Ratchet Wind Emergency Release Perfect Automatic Lubrication

Earll Catchers and Retrievers C. I. EARLL, York, Pa.

Canadian Agenta:
Railway & Power Engineering Corp., Ltd., Toronto, Ont.
In All Other Foreign Countries:
International Central Electric Co., Schenectady, N. Y.

DEPEND ON SULLIVAN AIR POWER

Do you need

100 to 240 cu. ft. of air per min., plus

Small floor space? Easy portability? Direct motor drive? Automatic or hand control? Continuous, operation? vibrationless

These advantages are offered by the new Sullivan "WL-22" cylinder, and "WL-44" cylinder vertical type compressors shown here.

For the shop or power plant that is short of floor space—for isolated departments in large plants—for standby or night service—or for the contractor desiring a semi-portable air unit, these compressors will be most attractive.

These new compressors are direct driven by electric motors, and both compressor and



NEW SULLIVAN VERTICAL COMPRESSORS

Special features of these ma-chines are "Wafer" inlet and discharge valves, sweep-control unloading device, positive automatic lubrication, and full water cooling of cylinder barrels and heads. They are adapted to push button, autocombination push button and automatic, start and stop control.

"WL-22" occupies a floor space 6x2½ ft.; "WL-44," 6x3 ft.

You will want to know more about these balanced "Vibrationless" compressors.

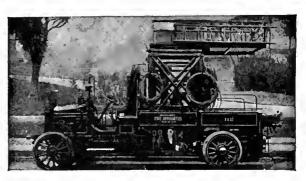
Write for Catalog 3283-H.

MACHINERY COMPANY

150 S. Michigan Ave.

Chicago





TRUCK WITH TOWER IN RUNNING POSITION

TRENTON TOWER This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.

Trenton, New Jersey, U. S. A.

Zuderbernnerntbenntaltigerntalte weneitherne erentalten disentalten det her der her mentem den beneither de se ≛

Rankers gineer

Ford, Bacon & Pavis

Engineers

115 liroadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER

Incorporated

Design and Construction Examinations Reports Appraisals Industrial and Public Service Properties BOSTON

NEW YORK

Sanderson & Porter

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design Examinations

Construction

Management Valuations

CHICAGO

NEW YORK

SAN FRANCISCO

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

A. L. DRUM & COMPANY

Consulting and Constructing Engineers VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF
ELECTRIC RAILWAYS

230 South Clark Street, Chicago, Ill.

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS

120 BROADWAY, NEW YORK

YOUNGSTOWN, O. CHICAGO, ILL.

FINANCING MANAGEMENT

Byllesby Engineering & Management Corporation

231 S. La Salle Street, Chicago

New York

San Francisco

E. H. FAILE & CO.

Designers of

Garages— Service Buildings—Terminals

441 LEXINGTON AVE

NEW YORK

The J. G. White **Engineering Corporation**

Engineers-Constructore

Oil Refinerles and Pipe Lines, Steam and Water Power Planta, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys Better Service—Financial Reports Appraisals—Management

52 Vanderhilt Ave.

New York

ENGELHARDT W. HOLST

Consulting Engineers

sisals Reports Rates Service Investigation Studies on Financial and Physical Rehabilitation Reorganization Operation Management

683 Atlantic Ave., BOSTON, MASS.

WALTER JACKSON

Consultant on Fares and Motor Buses.

The Weekly and Sunday Pass—Differential Fares—Ride Selling Holbrook Hall 5-W-3

160 Gramatan Ave., Mt. Vernon, N. Y.

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill APPRAISALS

INVESTIGATIONS COVERING Construction Reorganization Management Operation

43 Cedar Street, New York City

C. B. BUCHANAN President

W. H. PRICE, JR. Sec y-Tress.

JOHN F. LAYNG Vice-President

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction
Financial Reports, Traffic Surveys
and Equipment Maintenance

RALTIMORE
4 Citizens National
Bank Bidg.

Phone:
Hanover: 2142
49 Wall

NEW YORK 49 Wall Street

MCCLELLAN & JUNKERSFELD

Incorporated

ENGINEERING AND CONSTRUCTION Examinations—Reports—Valuations

Transportation Problems-Power Developments 68 Trinity Place, New York

Chicago

St. Louis

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES

ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CLEVELAND, Guardian Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANOELES, Central Building
NEW ORLEANS, 344 Camp Street

366889388342883368833288833288332883338833



WORKS Bayonne, N. J. Barberton, Ohio Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE., Falling Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, ROYAL BANK Building

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W. Washington Street, Chicago, Ill.

THE P. EDWARD WISH SERVICE

Street Railway Inspection DETECTIVES

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.





Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc. 101 Park Avenue, New York City

ILLINOIS MOTIVE EQUIPMENT COMPANY

J. D. Elsom, President

General Sales Agent—The Air Rectifier
District Representatives
Johnson Fare Box: McCloskey Bomb Shell Torch;
Cinch Vertical Swipe; Fyr-Fly Spot Light

35 E. Wacker Drive

Chicago, Illinois









We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment The Universal Lubricating Co.

Cleveland, Ohio Chicago Representatives: Jameson-Ross Company, Straus Bldg.

11110376331683111831318331683188311183111

THE WORLD'S STANDARD

"IRVINGTON"

Varnished Cambric, Varnished Silk,

Varnished Paper

Irv-O-Slot Insulation Flexible Varnished Tubing Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co. Irvington, N. J.

Sales Representatives:

Mitchell-Rand Mfg. Co., N. Y.
E. M. Wolcott, Rochester
I. W. Levine, Montreal
A. L. Gilliea. Toronto
Coosumers' Rubber Co., Cleveland

[8]]

Coil Trouble?

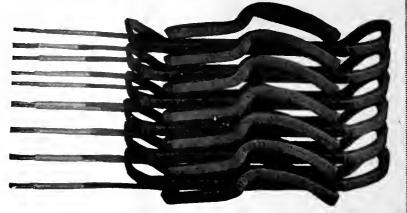
Whether or not you have coil trouble the long life and remarkable performance of Elliott-Thompson coils will prove

Forty years experience has taught us how to build coils that fit; that slip into grooves without abuse.

Naturally they last longer, reduce time and Investigate. Address-

> The Elliott-Thompson Electric Co.

Ajax Bldg., Cleveland, Ohio



Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa. Sales Offices:

Chicago Philadelphia

Pittsburgh

Cleveland Dallas

Pacific Coast Representative:

United States Steel Products Company
Angeles Portland San Francisce See

Export Representative:

United States Steel Products Company, Naw York, N. Y.

Bethlehem Products for **Electric Railways**

Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Frogs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Base Plates; Rolled Steel Wheels and Porged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

B. A HEOEMAN, Jr. President F. T. SARGENT, Secretary

H. A. HEOEMAN, First Vice-Pres. and Treas. J. M. PRATT, Vice-Pres. in charge of asies

National Railway Appliance Co. Graybar Building, 420 Lexington Ave., New York

BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass, Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Pinlons
Anglo-American Varnish Co.,
Varnishes, Enamels, stc.
National Hand Holds
Genesco Paint Oils
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Plows
Feasible Drop Brake Staffs
Ft. Pitt Spring & Mfg. Co.,
Springs

Flaxlinum Insulation Economy Electric Devices Co. Power Saving and Inspection

Meters
National Safety Devices Company's Whistie Blowers,
Goog Ringers and Brake
Hangers
Godward Gas Generators
Cowdry Automotive Brake
Testing Machine

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small, electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.



Double Register Type R-11

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

The International Register Co. 15 South Throop Street, Chicago, Illinois

TISCO MANGANESE STEEL SPECIAL TRACKWORK

Wharton Tisco Manganese Steel Trackwork will help you hold the up-keep down.

WM. WHARTON JR. & CO., Inc. Easton, Penna.

SECTION EARCHLIGHT

USED EQUIPMENT @ NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED-RATE PER WORD:

Positions Wonted, 4 cents a word, minimum 75 cents an insertion, payable in advance. Positions Vacant and all other classifications, 8 cents a word, minimum charge \$2.69, Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers, in care of any of our offices count 10 words additional in undisplayed ads. Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches. \$4.50 an inch
4 to 7 inches. 4.36 an inch
8 to 14 inches. 4.10 an inch
Rates for larger spaces, or yearly rates, on request. An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

POSITIONS VACANT

LARGE Eastern property has opening for young experienced schedule maker. In first letter give full details, references, experience, and salary expected. P-86, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

OLD established company, conducting business with electric railway companies for many years, has position open for man having railway and bus experience from an operating and accounting standpoint. Address, Box 998, Dayton, Ohio.

POSITIONS WANTED

DISTRIBUTION engineer in charge of all outside electrical equipment, poles and fixtures, track bonding, overhead and underground cables and trolley lines, signals and switches; experienced and successful; single; will consider any part of country or foreign countries; excellent references. PW-85, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

GENERAL, superintendent or manager; successful; seeks connection with a future. PW-77, Electric Rallway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation; available in near future; qualified by wide experience; a proven successful record, city and interurban railways and coordination rail and bus service; recognized ability in dealing successfully with labor and public and all transportation problems; qualified by experience and ability to successfully fill position of superintendent or assistant manager; correspondence invited; high grade references. PW-82, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

WOULD like to correspond with any company needing a high-grade official in any capacity, in city or interurban railways; can manage any or all departments in the cost efficient manner. PW-33, Electric Railway Journal, Guardian Bldg., Cleveland, Ohlo.

When Writing Your Ad

Provide an indexing or subject word.

Write it as the first word of your ad.

If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

This will assure proper classification in the column.

The right is reserved to reject, revise or properly classify all Want Advertisements.

Proper Classification increases the possibility of Prompt Returns

FOR SALE

Standard Gage Interurban Cars Cincinnati Built

Combination Passenger, Smoking and Baggage Cars, Monitor deck with steam coach type hood.

Length 50 Ft. Seat Cap. 46 Trucks-Brill 27-E-1 Doors-Rear, Folding Seats-H.&K.

Total Weight, 31 Tons Motors-4-G.E. 90-A Wheels-33 in., 3 in. tread Extreme Width-8 ft. 10 in. Truck Ctrs .- 28 ft. 4 in.

Complete \$5,000 ea. F. O. B. Sheboygan, Wis.

WISCONSIN POWER & LIGHT COMPANY 900 GAY BUILDING, MADISON, WISCONSIN

Send for Special Bulletin on light weight, all steel, single and double truck

Or, for complete description-with prices-see our full page ad. in Jan. 14 issue Electric Railway Journal, half page Jan. 21 issue or quarter page Feb. 4 issue.

The Irving S. Van Loan Corp. 1819 Broadway, New York City Telephone: Columbus 4278

BARGAINS IN CARS!
See our advertisement in the January 28th and February 4th issues for offerings of modern cars at unusually low prices—or write us for particulars!

G. T. ABEL Used Railway Equipment 393 7th Ave., New York City Telephone Longacre 7372

FOR SALE

15 BIRNEY SAFETY CARS Brill Bullt

West, 508 or G. E. 264 Motore Cars Complete—Low Price—Fine Condition ELECTRIC EQUIPMENT CO. Commonwealth Bldg., Philadelphia, Pa.

A COMPLETE POWER HOUSE EQUIPMENT

-250 hp. B. & W., and 4-354 hp. Sterling Boilers with Murphy furnaces

12—250 hp. B. & W.. and 4—354 hp. Sterling Boilers with Murphy furnaces and stokers.
6—750 hp. Hoppe Live Steam Purifiers.
1—2.000 hp. Cochran Open Heater.
4—1.500 hp. 28x52 Allis-Chalmers Tandem Compound Condensing Engines.
1—2.500 hp. 32x08 Allis-Chalmers Tandem Compound Condensing Engines.
2—1.000 kw., 575 v. General Elec. D.C. Railway Generators.
2—1.000 kw., 575 v. Westinghouse D.C. Railway Generators.
1—1.500 kw., 625 v. Westinghouse D.C. Railway Generators.
1—1.500 kw., 625 v. Westinghouse D.C. Railway Generator.
4—14x22x15 Worthington Duplex Air Pumps and Condensers.
1—26-in. Tomlinson Barometric Condenser with 6x6-ft. Hot Well.
1—10-in. Lawrence Steam Driven Centrifingal Pump with vertical engine 8x9.
2—Worthington Compound Boiler Feed Pumps, 10x16x8½x10.
1—Worthington Compound Boiler Feed Pomp, 12x17x9½x15.
1—Worthington Compound Fire Steam Pump, 10x5x10.
1—Davidson Simplex Pump, 6x3½x6.
1—350 kw. Westinghouse 350 v. D.C. Generator, series wound, 420 r.p.m. direct connected to 1—520 hp. West. 550 v. D.C. shunt wound Motor.
1—Brown Hoisting Co. Cruoe, 60 ft. span, 25 ton, hand operated.
1—Link Chain Bucket Conveyor, motor driven type.
Also all miscellaneous, as piping, oil pumps, filters, compressor, steel stack and breeching, coal and ash bunkers. All equipment on foundations and in operating condition. Will sell as a whole or in part.
CITY OF DETROIT CITY OF DETROIT

Department of Street Railways G. W. WAGNER, Supervisor of Purchases.

"Opportunity" Advertising:

Think "SEARCHLIGHT" First!

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Nan.es of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but L'lectric Railway Journal assumes no responsibility for errors or omissions.

Advertising, Street Car Collier Inc., Barron G. Air Brakes General Electric Co. Westinghouso Air Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools Columbia Machine Wks Elec. Service Supplies Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands Ramapo Ajax Corp.

Axles Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Axles, Front Shuler Axle Co. Axles, Steel Bethlehem Steel Co. Badgea and Buttons
Elec. Service Supplies Co.
International Register Co. Batteries, Dry
National Carbon Co.
Nichols-Lintern Co.

Nichols-Lintern Co.
Bearings, Antl-Friction
Hyatt Roller Bearing Co.
Bearings and Rearing Metals
Bemis Car Truck Co.
Cincinnati Car Co.
Columbia Machine Wks.
Drew Elec. & Mfg. Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller
Side

Cincinnati Car Co.

Stucki Co., A.

Bearings, Roller and Ball
Hvatt Roller Bearing Co.
Timken Roller-Bearing Co.

Bells & Buzzers Consolidated Car Heating Co.

Communicated Car Heating C Bells and Gongs Brill Co., The J. G. Cincinnati Car Co. Columbia Machine Wks. Elec. Service Supplies Co. Benders, Rail

Railway Trackwork Co. Railway Trackwork Co.

Rodies, Ros

Bender Body Co.

Brill Co., The J. G.

Cummings Car & Coach Co

Fitzjohn Mfg. Co.

Body Material—Haskelite &

Plymetl

Haskelite Mfg. Corp.

Boilers Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Elec. Service Supplies Co.

Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Drew Elec. & Mfg. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, etc.,
Columbia Machine Wks.
Electric Railway Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Railway Appliance Co. Westinghouse Traction Br. Brake Shoes
American Brake Shoe &
Foundry Co.
Bennis Car Truck Co.
Brill Co., The J. G.

Brake Testers
National Railway Appliance Co.

ance Co.
Brakes, Brake Systems and
Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
General Electric Co.
National Brake Co.
Westinghouse Traction
Brake Co. Brake Co.

Brakes, Magnetic Rail Cincinnati Car Co.

National Paving Brick Mfrs. Asso.

Brick, Vitrified National Paving Brick Mfrs. Asso.

Brushes, Carbon
General Electric Co.
National Carbon Co.
Westinghouse E. & M. Co.

Brushes, Graphite National Carbon Co.

Brushes, Metal Graphite National Carbon Co. Brushholdera Columbia Machine Wks. General Electric Co.

Rulkheads Haskelite Mfg. Corp.

Bus Lighting
National Railway Appliance Co.

Ruses

Cummings Car & Coach Co International Harvester Co Versare Corp.

Buses, Gas, Electric General Electric Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co.. The J. G.
Cincinnati Car Co,
Columbia Machine Wks

Cables (See Wires and Cables)
Cambric Tapes, Yellow and Black Varnished General Electric Co. Irvington Varnish & Ins. Co. Mica Iusulator Co. Yellow and

Carbon Brushes (See Brushes, Carbon) Carbon Paste, Welding National Carbon Co. Carbon Plates, Welding National Carbon Co. Carbon Rods, Welding National Carbon Co.

Car Lighting Fixtures
Elec. Service Supplies Co. Car Panel Safety Switches Consolidated Car Heating Co. Westinghouse E. & M. Co.

Car Steps, Safety Cincinnati Car Co. Car Wheels, Boiled Steel Bethlehem Steel Co.

Car Wheels, Roiled Steel
Bethlehem Steel Co.
Co.,
Co.,
Cars, Dump
Brill Co., he J. G.
Differential Steel Car Co.
Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & Mfg.
Cars, Gas, Rail
Brill Co., The J. G.
Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co
Kuhlman Car Co., G. C.
Wason Car Co.
Cars, Self-Propelled
Brill Co., The J. G.
Cars, Second Hand
Electric Equipment Co.
Instings, Brass Composition
or Copper
Cincinnati Car Co.

Electric Equipment Co., Constings, Brass Composition or Copper Cincinnati Car Co. Columbia Machine Wks. Eureka Copper Prod. Co.

Castings, Gray Iron and Steel Benus Car Truck Co. Columbia Machine Works & Standard Steel Works Co. Inc. Wm. Wharton, Jr. & Co.,

Wm. Wharton, Jr. & Co. Castings, Malleable & Brass Bemis Car Truck Co. Columbia Machine Wks. Catchers and Retrievers, Trolley Earll, C. I. Elec. Service Supplies Co. Ohio Brass Co. Ceiling Car Haskelite Mfg. Corp. Ceilings, Plywood Panels Haskelite Mfg. Corp.

Chairs, Parlor Car Heywood Wakefield Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Change Trays Cincinnati Car Co.

Cincinnali Car Co.
Cirnuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for
Wires and Cables
Columbia Machine Wks.
Electric Railway Equipment
Elec. Service Supples Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Serangers Track

Westinghouse E. & A. Co. Cleaners and Strapers, Track (See also Snow-Plows Sweepers and Brooms) Brill Co., The J. G. Cincinnati Car Co.

Coal and Ash Handling (See Conveying and Holsting Machinery)

Machinery)
Coll Banding and Winding Machines
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
Colls, Armature and Field
Columbia Machine Wks.
Elliott Thompson Electric
Co.

Co.
General Electric Co.
Westinghouse E. & M. Co Colls. Choke and Kicking Elec. Service Supplies Co. General Electric Co. Westinghouse E. & M. Co. Coln Changers
Illinois Motive Equipment

Johnson Fare Box Co. Coln Counting Machines Cleveland Fare Box Co. International Register Co. Johnson Fare Box Co. Coln Sorting Machines Cleveland Fare Box Co. Johnson Fare Box Co.

Coin Wrappers Cleveland Fare Box Co.

Cleveland Fare Box Co.
Commutators, Parts
General Electric Co.
Commutator Slotters
Columbia Machine Wks,
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
Commutators or Parts
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.
Compressors, Air
General Electric Co.
Sullivan Machinery Co.
Compressors, Portable
Sullivan Machinery
Co.
Compressors, Gas
Sullivan Machinery
Co.
Compressors, Gas
Sullivan Machinery
Co.
Compressors, Gas
Sullivan Machinery
Co.
Condensers

Condensers Westinghouse E. & M. Co.

Westinghouse E. & M. Co. Connectors, Solderless Westinghouse E. & M. Co. Connectors, Trailer Car Columbia Machine Wks. Consolldated Car Heating Co. Elec. Service Supplies Co. Ohio Brass Co. Controllers or Parts Columbia Machine Wks. General Electric Co. Westinghouse E. & M. Co. Controller Regulators

Controller Regniators
Elec. Service Supplies Co.
Controlling Systems
General Electric Co. Westinghouse E. & M. Co.

Converters, Rotary General Electric Co. Westinghouse E. & M. Co.

Copper Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.
Page Steel & Wire Co.

Copper Wire Instrumenta
Measuring, Testing and
Recording
American Brass. Co.
Amaconda Copper Mining Co.

Anaconda copper mining Co.
Cord. Bell, Trolley, Register
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., J. A.
Samson Cordage Works

Cord Connectors and Couplers Elec. Service Supplies Co. Samson Cordage Works

Couplers, Car
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators Nichols Lintern Co. Cranes, Hoist and Lift Electric Service Supplies

Co. Eureka Copper Prod. Co. Cross Arms (See Brackets) Crossing Foundations International Steel Tie Co.

Crossing, Frog and Switch Ramapo Ajax Corp. Wm. Wharton,Jr.& Co., Inc.

Crossing Manganese Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Whartou,Jr.& Co., Inc. Crossings Wm. Wharton Jc. & Co. Ramapo Ajax Corp.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co. Curtains & Curtain Fixtures Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Railway Track Work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Dealer's Machinery & Second Hand Equipment Abel, G. T. Elec. Equipment Co. Van Loan Corp., Irving S.

Derailing Devices (See also Track Work)

Deralling Switches Ramapo Ajax Corp.

Destination Signs
Columbia Machine Wks.
Electric Service Supplies
Co.

Detective Service Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.,

Doors and Door Fixtures Brill Co.. The J. G. Cincinnati Car Co. Hale-Kilburn Co. Safety Car Devices Co. Doors, Folding Vestibule National Pneumatic Co.

Drills, Rock Sullivan Machinery Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Elec, Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Wks,
Electric Service Supplies
Co.
General Electric Co.
Ohlo Brass Co.
Westinghouse E. & M. Co. Electric Grinders Railway Trackwork Co.

Electric Rivet Heaters American Car & Foundry Co.

Electrical Wires and Cablea Amer. Electrical Works American Steel & Wire Co. Roebling's Sons Co., John

Electrodes, Carbon Railway Trackwork Co. Una Welding & Bonding Co. Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Una Welding & Bonding Co.
Engineers, Consulting, Contracting and Operating
Beeler, John A.
Buchanan & Layng Corp.
Byllesby Eng, & Man. Corp.
Day & Zimmermann, Inc.
A. L. Drum & Co.
Faile & Co., E. H.
Ford, Bacou & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sandersou & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Engines, Gas, Oll or Steam

Engines, Gas, Oll or Steam Westinghouse E. & M. Co. Exterior Slde Panels Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Illinois Motive Equipment Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.
Perey Mfg. Co., Inc.

Fare Registers
Electric Service Sup. Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.

Ohmer Fare Register Co.
Fences, Woven Wire and
Fence Posts
Acme Wire Co.
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Star Brass Works
Fibre and Fibre Thbing
Westinghouse E. & M. Co.
Field Coils (See Coils)
Flachlichts

Flashlights National Carbon Co.

Floodlights
Elec. Service Supplies Co.
General Electric Co. Floor, Sub. Haskelite Mfg. Corp.

Floors Haskelite Mfg. Corp.

Haskelite Mfg. Corp.
Forgings
Brill Co., The J. G.
Carnegie Steel Co.
Clincinnati Car Co.
Columbia Machine Works
Eureka Copper Prod. Co.
Standard Steel Works Co.
Frogs & Crossings, Tee Bail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
Frogs. Track (Sre Track

Wm. Wharton, Jr. & Co., Inc. Frogs, Track (See Track Work) Progs, Trolley Electric Service Supplies Co. General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co. Funnell Castings Wm. Wharton, Jr. & Co., Inc. Fuses and Fuse Boxes Columbia Machine Wks. Consolidated Car Heating Co. General Electric Co. Westinghouse E. & M. Co. (Coutinued on page 44)

(Continued on page 44)

"The Standard for Rubber Insulation"

INSULATED WIRES and CABLES

"Okonite." "Manson," and Dundee "A" "B" Tapes

Send for Handbook

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories, PASSAIC, N. J.

PATERSON, N. J.

Officer. New York Chicago Pittsburgh St. Louis Atlanta
Birmingham San Francisco Los Angeles Seattle

Pettingeli-Andrews Co., Boston, Mass. F. D. Lawrence Electric Co., Cincinnati, O. Novelty Eisetric Co., Phila., Pa.

Rep.; Engineering Materiate Limited, Montreat, Cubon Rep.: Victor G. Mendoza Co., Havana.

Arc Weld il Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

CHICAGO, NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADEL-PHIA, PITTSBUROH, BUFFALO, DETROIT, CINCINNATI, BALTIMORE, WILKES-BARBE, ST LOUIS, KANSAS CITY, ST, PAUL. OKLAHOMA CITY, BIRMINGHAM, MEMPHIS, DALLAS, ATLANTA, DEEVER, SALT LAKE CITY EXPORT BEPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK PACIFIC COAST BEPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LOS ANGELES, PORTLAND, SEATTLE.



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

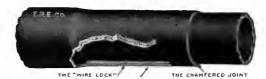
PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 20-32 West Randolph Street. Cincinnati, Traction Bldg.: New York, 100 E. 42nd St.

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Least Maintenance

Lightest Weight Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO. CINCINNATI, OHIO

New York City, 30 Church Street

CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

WITH OPEN COIL OR ENCLOSED ELEMENTS ELECTRIC HEATERS THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE

NACHOD & UNITED STATES SIGNAL CO., INC. LOUISVILLE, KY. **BLOCK SIGNALS**

ELECTRIC RAILWAYS HIGHWAY CROSSING SIGNALS



in this space in all issues where larger display space is not used backs up your advertising* campaign and keeps your name in the alphabetical index.



Rod, Wire and Cable Products

ANACONDA ANACONDA COPPER MINING COMPANY General Offices - . 25 Broadway, New York

ANACONDA TROLLEY WIRE

Your Name



CEDAR POLES

WESTERN

BELL LUMBER CO., Minneapolis, Minn.



CREUSOTED

Railroad Cross-ties; Switch-ties; Bridge Tim-bers; Construction Timbers; Mine Timbers Lumber; Piling; Poles; Posts and other Forest Products

F.Prettyman & Sons
Wood Preserving Plant
Charleston. S.C.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off. of extra quality stock firmly braided and smoothly finished Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

Garage Equipment Columbia Machine Works & M. I. Co. Westinghouse Tr. Br. Co. Gas Electric Drive for Boses & Trucks
General Electric Co. Gas Producers
Westinghouse E. & M. Co. Gasoline Standard Oil Co. Gates, Car Brill Co., The J. G. Cincinnati Car Co. Gear Blanks
Bethlehem Steel Co.
Carnegie Steel Co.
Brill Co., The J. G.
Standard Steel Works Co. Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co. Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia Machine Wks.
Electric Service Supplies General Electric Co. National Railway Appliance Co. R. D. Nuttall Co. Tool Steel Gear & Piuion Co. Generators
General Electric Co.
Westinghouse E. & M. Co. Girder Rails
Bethlehem Steel Co.
Lorain Steel Co. Gungs (See Bells and Gongs) Grease Texas Company Texas Company
Grinders and Griodlog
Sopplies
Railway Trackwork Co.
Grinders, Portable
Railway Trackwork Co.
Grinders, Portable Electric
Railway Trackwork Co. Grinding Bricks and Wheels Railway Trackwork Co. Ground Wires Page Steel & Wire Co. Guard Rail Clamps Lorain Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.,Inc. Guard Rails, Tee Rall and Manganese Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.,Inc. Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Harps, Trolley
Columbia Machine Works &
M. I. Co.
Elec. Service Supplies Co. General Electric Co. Ohio Brass Co. R. D. Nuttall Co. Star Brass Works Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohin Brass Co.
Headlining
Columbia Machine Wks.
Haskelite Mfg. Corp.
Heaters, Bus
Nichols-Lintern Co.
Henters, Car (Electric)
Consolidated Car Heating
ing Co. ing Co. Gold Car Heating & Light Co.
Railway Utility Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and
Wafer
Smith Heater Co., Peter Heaters, Car. Stave Smlth Heater Co., Peter Heaters, Electric Rivet American Car & Foundry Co. Helmeis—Welding Railway Trackwork Co. Uua Welding & Bonding Co Halete Sullivan Machinery Co. Iose, Bridges Ohio Brass Co. Hose, Pneumatic Westinghouse Traction Brake Co. Industrial Tractors International Harvester Co International Harvester Co Instruments, Measuring, Tesling and Recording American Steel & Wire Co. General Electric Co. National Railway Appliance Cn.
Westinghouse E. & M. Co.
Insulating Cloth, Paper and Tape
General Electric Co
Irvington Varnish & In* Co.

Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co.
Inc.
Westinghouse E. & M. Co.
Insulating Silk
Irvington Varnish & Ins. Co.
Insulating Varnishes
Irvington Varnish & Ins. Co.
Insulation (See also Paints)
Electric Railway Equipment
Co. Electric Railway Equipment Co. Electric Service Sup. Co. Irvington Varnish & Ins. Co. Mica Insulator Co. Okonite Co. Okonite Callender Cable Co. Inc. Westinghouse E. & M. Co. Insulation Slat Irvington Varnish & Ins. Co. Irvington Varnish & Ins. Co.
Insulator Plas
Elec. Service Supplies Co.
Ohio Brass Co.
Insulators (See also Line
Material)
Electric Railway Equipment
Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Interior Side Linings Interior Side Linings Haskelite Mfg. Corp. Internrban Cars (See Cars Passenger, Freight Express etc.) etc.)
Jacks (See also Cranes,
Hnists and Lifts)
Columbia Machine Wks.
Elec. Service Supplies Co.
Oil Jack Co. Joints, Rail (See Rail Joints)
Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
S. K. F. ludustries, Inc. Lamps, Guards and Fixtures Elec. Service Sup. Co. Westinghouse E. & M. Co. Lamps, Arc and Incandescent (See also Headlights) General Electric Co. Westinghouse E. & M. Co. Lamps, Signal and Marker Eiec. Service Supplies Co. Nichols-Lintern Co. Lanterns, Classification Nichols-Lintera Co. Letter Bourds
Haskelite Mfg. Corp.
Nichols-Lintern Co.
Cincinnati Car Co. Lighting Fixtures, Interior Electric Service Supplies Lightning Protection
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co. Line Muterial (See also Brackets, Insulators, Wires, etc. Electric Railway Equipment Co. Electric Service Sup. Co. Electric Service Sup. Co. Ohio Brass Co. Westinghouse E. & M. Co. Locking Spring Boxes
Lorain Steel Co.
Wm. Wharton, Jr. & Co.,
Inc. Commotives, Electric Cincinnati Car Co. Cummings Car & Coach Co General Electric Co. St. Louis Car Co. Westinghouse E. & M. Co. Luphylacting Engineers Lubricating Engineers
Standard Oil Co.
Universal Lubricating Co. Lubricants, Oil and Greace Standard Oil Co. Universal Lubricating Co. Manganese Parts Bemis Car Truck Co. Machinery, Insulating Amer. Insulating Mach. Co. Manganese Steel Castings
Lorain Steel Co.
Wm. Wharton, Jr. & Co.,
Inc. Manganese Steel Guard Rails Ramapo Ajax Corp. Wm. Wharton, Jr. & Co., Inc.
Manganese Steel, Special
Track Works
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co..
Inc.
Manganese Steel Switches,
Frngs and Crossings
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co..
Inc.
Mica

Mica Insulator Co.

Mirrors, Inside and Outside Cincinnati Car Co. Motor Buses (See Buses) Motors, Generators & Con-trols for Gas Electric Buses General Electric Co. Motors, Electric General Electric Co. Westinghouse E. & M. Co. Motorman's Senis
Brill Co., The J. G.
Clocionati Car Co.
Electric Service Sup. Co.
Hale-Kilburn Co.
Heywood Wakefield Co. Nuts and Bolts
Bemis Car Truck Co
Bethlehem Steel Co.
Cincinnati Car Co. Omnibuses (See Buses) Oxy-Acetylene (See Cutting Apparatus) Packing
Westinghouse Traction
Brake Co.
Paints and Varnishes (Insulating)
Electric Service Sup. Co.
Irvington Varnish & Ins. Co. Mica Insulator Co. Paints & Varnishes, Railway National Ry. Appliance Co. Panels, Odiside, Inside Haskelite Mfg. Corp. Paving Materials, Vitrified Brick National Paving Brick Mfrs. Asso. Pavement Breakers Sullivan Machinery Co. Pickups, Trolley Wire Drew Elec. & Mig. Co. Elec. Service Supplies Co. Ohio Brass Co. Pinion Pullers
Drew Elec. & Mig. Co.
Elec. Service Supplies Co.
Pinions (See Gears) Pins, Case Hardened, Wood and Iron Bemis Car Truck Co. Ohlo Brass Co. Westinghouse Tr. Brake Co. Pipe Fittings Standard Steel Works Co. Westinghouse Tr. Brake Co. Planers (See Machine Tools) Plates for Tee Rail Switches Ramapo Ajax Corp. Pliers, Rubber Insulated Electric Service Sup. Co. Plywood (Roofs, Headlining rywood (Roots, Headining Floors, Interinr Panels, Bulkheads, Truss Planks) Haskelite Mfg. Corp. Pneumatle Tools Ingersoll-Rand Co. Pole Line Hardware Bethlehem Steel Co. Electric Service Sup. Co. General Electric Co. Ohio Brass Co. Poles, Metal Street Bates Steel Co., Walter Electric Railway Equipment Co Union Metal Mig. Co. Union Metal Mig. Co.

Poles, Ties, Posts, Piling and Lumber
Bell Lumber Co.
International Croosoting & Construction Co.
Naugle Pole & Tie Co.
J. F. Prettyman & Son
Poles & Tles, Treated
Bell Lumber Co.
International Croosoting & Construction Co. Poles, Tralley
Bell Lumber Co.
Electric Service S
R. D. Nuttall Co. Sun. Co. Poles, Tabular Steel Electric Railway Equipment Co. Electric Service Sup. Co. Potheads Okonite Co. Okonite-Callender Cable Co. Inc. Power Saving Devices
National Railway Appliance
Co. Pressings, Special Steel Cincinnati Car Co. Pressure Regulators General Electric Co. Westinghouse E. & M. Westinghouse Traction M. Co. Brake Co. Pumns, Air Lift Sullivan Machinery Co. Pumus, Vacuum Sullivan Machinery Co. Punches, Ticket International Register Co.

Rail Rraces and Fastenings Ramapo Ajax Corp. Rail Grinders (See Orloders) Rail Joints Rail Joint Co., The Bail Joints—Welded Lorain Steel Co. Rails, Steel Bethlehem Steel Co. Rail Filler
Carey Co., The, Philip
Rail Welding
Railway Trackwork Co.
Una Welding & Bonding Co. Railway Safety Switches Consolidated Car Heating Co Westinghouse E. & M. Co. Rattan Brill Co., The J. G. Cummings Car & Coach Co Electric Service Sup. Co. Hale-Kilburn Co. Battan, Car Seat, Webbing Heywood Wakefield Co Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Electric Service Sup. Co.
International Register Co.
Ohmer Fare Begister Co. Reinforcement, Concrete Amer. Steel & Wire Co. Bethlehem Steel Co. Carnegie Steel Co. Repair Shop Appliances (See also Coil Banding and Winding Marhines) Elec. Service Supplies Co. Repair Work (See also Colls) Westinghouse E. & M. Co. Replacers, Car Cincinnati Car Co. Electric Service Sup. Co. Resistances
Consolidated Car Heating Co
General Electric Co. Resistance, Wire and Tube American Steel & Wire Co. Westinghouse E. & M. Co. Retrievers, Trolley (See Catchers and Retrievers, Trolley) Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co. Rivet Heaters, Electric American Car & Foundry Co. Roller Bearings Hyatt Boller Bearing Co. Ronf Covering Chase & Co., L. C. Rnofing, Car Haskelite Mfg. Corp. Roofs, Car & Bas Haskelite Mfg. Corp. Sanders, Track,
Brill Co., The J. G.
O. M. Edwards Co., Inc.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co. Sash Fixtures, Car Brill Co.. The J. G. Cincinnati Car Co. Sash, Metal. Car Window Hale-Kilburn Co. Scrapers, Track (See Cleaners and Scrapers, Track) Screw Drivers, Rubber Insulated Electric Service Sup. Co. Seating Materials
Brill Co., The J. G.
Fitzjohn Mfg, Co.
Hale-Kilburn Co.
Haskelite Mfg, Corp.
Heywood Wakefield Co Seats, Bus Brill Co., The J. G. Hale-Kilburn Co. Heywood Wakefield Co Seats, Car (See also Ratian) Brill Co., The J. G. Cincinnati Car Co. Hale-Kilburn Co. Heywood Wakefield Co Second Hand Equipment Abel, G. T. Electric Equipment Co. Van Loan Corp., Irving S. Shades, Vestibule
Brill Co., The J. G.
Cinclinati Car Co. Shovels Brill Co., The J. G. Srift Co., The J. G.
Shovels, Power
Brill Co., The J. G.
Side Bearings (See Bearing
Center and Side)
Signals, Car Starting
Consolidated Car Heating Co
Electric Service Sup. Co.
National Pneumatic Co.,
Inc.

Signal Systems, Block
Electric Service Sup. Co.
Nachod & U. S. Signal Co.
Signal Systems, Highway
Crussing
Nachod & U. S. Signal Co.
Slack Adjusters (See Brake
Adjusters) Slag Carnegie Steel Co. Sleet Wheels and Cutters Columbia Machine Wks. Cincinnati Car Co. Electric Railway Equipment Co. Electric Service Supplies Co. R. D. Nuttall Co. Smokestacks, Car Nichols-Lintern Co. Snow Plows National Railway Appliance Snaw-Plows, Sweepers and Brooms
Brill Co., J. G.
Columbia Machine Wks.
Consolidated Car Fender Co.
Cummings Car & Coach Co Snow Sweeper, Rattan Brill Co.. J. G. Heywood Wakefield Co. Soldering and Brazing Ap-paratus (See Welding Processes and Apparatus) Special Adhesive Papers Irvington Varnish & Ins. Co. Special Trackwork Bethlehem Steel Co. Wm. Wharton, Jr. & Co., Inc. Lorain Steel Co. Spikes American Steel & Wire Co. American Steel & Mile So.
Splicing Compounds
Westinghouse E. & M. Co.
Splicing Sleeves (See Clamps
and Copnectors) Springs
National Railway Appliance Co. Ance Co.
Springs, Car and Truck
American Spiral Spring Co.
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Clucinnati Car Co.
Standard Steel Works Co. Sprinklers, Track and Road Brill Co., The J. G. Cummings Car & Coach Co. Steel and Steel Products American Steel & Wire Co. Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.
Stokers, Meshanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co. Stop Signals
Nichols-Lintern Co.
Siorage Batteries (Storage) (See Bat-Strain, Insulators
Electric Service Supplies Co.
General Electric Co.
Ohin Brasa Co.
Westinghouse E. & M. Co. Strand American Steel & Wire Co. Roeblings Sons Co., J. A. Street Cars (See Cars, P senger, Freight, Expre etc.) Saperheaters Babcock & Wilcox Co. Sweepers, Snow (See Snow Plows, Sweepers and Brooms)
Switch Stands and Fixtures Ramapo Ajax Corp.
Switches General Electric Co. Switches, Selector Nichols-Lintern Co. Switches and Switchboards
Consolidated Car Heating
Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co. Switches, Tee Rall Ramapo Ajax Corp. Switches, Track (See Track Special Work) Tampers, Tie Railway Trackwork Co. Tapes and Cloths (See Insulating Cloth, Paper and Tape)
Tee Rall Special Track Work
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc. Telephones and Parts Electric Service Sup. Co. Telephone & Telegraph Wire American Steel & Wire Co. J. A. Roeblings Sons Co. Inc.
Signals, Indicating
Nichols-Lintern Co (Continued on page 46)

D



AIMco

Electric Railway Automatic Signals for Accessibility and Reliability



521 Huntington St. Philadelphia, Pa.



Boyerized Parts:

Brake Pins
Broke Haugers
Broke Haugers
Broke Levers
Broke Levers
Broke Levers
Broke Haugers
Broke Haugers
Broke Haugers
Broke Haugers
Broke Haugers
Broke Haugers
Bolster and Transom
Chafing Plates
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings
Turnbuckles
Turnbuckles

Can be purchased through the following representatives:

F. F. Bodler, 903 Monadnock Bidg., Sao Francisco, Cal. W. F. McKannay, 54 First Street, Portland, Oragon.

J. H. Dentou. 1328 Broadway, New York City, N. Y.

A. W. Arlin. 519 Deita Bidg., Los Angeles, Cai.

Bemis Car Truck Company Springfield, Mass.

RAIL JOINTS

The Rail Joint Company 165 Broadway, New York City

Coin Counting and Sorting Machines

FARE BOXES

Lever-Operated and Slip Change Carriers

The Cleveland Fare Box Co. Cleveland, Ohio Canadian Cleveland Fare Box Co., Ltd., Preston, Ont.

> "Opportunity" Advertising:

Think "Searchlight" First!

The DIFFERENTIAL CAR



Standard on 60 Railways for

Track Maintenance
Track Construction
Ash Disposal
Coal Heuling Concrete Materials
Waste Handling
Excavated Materials
Hauling Cross Tiss
Snow Disposal

Use These Labor Savers

Differential Crane Car Clark Concrete Breaker Differential 3-way Auto Truck Body Differential Car Wheel Truck and Tracter

THE DIFFERENTIAL STEEL CAR CO., Findlay, O.

Efficient Bus Heating with

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.

7960 Lorain Ave.

Cleveland, Ohio

HEATERS

REGULATORS VENTILATORS

2247 Indiana St.

1328 Broadway New York, N. Y





CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetices—Light Weight Best for Service — Durability and Economy. Write Us.

Chillingworth Mfg. Co. Jersey City, N. J.

H B LIFE GUARDS

PROVIDENCE FENDERS

Manufactured by

CONSOLIDATED CAR FENDER CO., PROVIDENCE, R. I.

General Sales Agents
WENDELL & MacDUFFIE CO., 110 E. 42nd St., N. Y. C.



Car Heating and Ventilating

—are 10 longer operating problems. We san show you how to take care of both with one equipment. The Peter Smith Forced Ventilation Hot Air Heater will save, in addition, 49% to 66% of the cost of any other ear heateg and ventilating system. Writs for details.

The Peter Smith Heater Company 6209 Hamilton Ave., Detroit, Mich.



STUCKI BEARINGS

A. STUCKI CO. Oliver Bldg. Pittshurgh, Pa.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
A	Electric Railway Equipment Co. 43	L	
Abel, G. T	Electric Scrvice Supplies Co 9 Elliott-Thompson Electric Co., The	Lorain Steel Co., The 40	Ramapo-Ajax Co. 45 Richey, Albert S. 38 Roebling's Sons Co., John A. 39
American Car Co Third Cover	F	M	s
American Electrical Works 43 American Insulating Mach. Co., 45 American Steel & Wire Co 43 American Spiral Spring Mfg. Co., Insert, 284b Anaconda Copper Mining Co 43	Faile & Co., E. H	McCardell Co., J. R	Samson Cordage Works 43 Sanderson & Porter 38 Searchlight Section 41 Shuler Axle Co 35 Smith Heater Co Peter 45
	G		Standard Oil Co
В	General Tire & Rubber Co., The. 26	N	Star Brass Works 40
	General Electric Co 20		Stevens & Wood, Inc. 38 Stone & Webster 38
Babcock & Wilcox Co	Gold Car Heating & Ltg. Co 43	Nachod and United States Signal Co., Inc., 43	Stucki Co., A
Beeler Organization, The	H	National Brake Co., Inc 21 National Carbon Co 30	bunivan Machinery Co 37
Bemis Car Truck Co	n n	National Paving Brick Mfrs. Asso	
Bethlehem Steel Co 40 Brill Co., The J. GThird Cover	Hale & Kilburn Co	National Pneumatic Co 13	T
Buchanan & Layng Corporation, 38 Byllesby Eng. Man. Corp 38	"Help Wanted" Ads. 41 Hemingray Glass Co. 36 Hemphill & Wells 38 Heywood-Wakefield Co. 27	National Railway Appliance Co. 40 Naugle Pole & Tie Co. 43 Nichols-Lintern Co., The. 45 Nuttall Co., R. D	Tool Steel Gear & Pinion Co., Insert. 284a
C	Holst Englehardt W 38		
Carey Co., The Philip30a	Hyatt Roller Bearing Co 19		v
Chase & Co., L. C	e e	0	Una Welding & Bonding Co 39
Chillingworth Mfg. Co 45 Cincinnati Car Co14-15	•	Ohmer Fare Register Co 32	Universal Lubricating Co 39
City of Detroit, Dept. of St. Rep. 41 Cleveland Fare Box Co., The 45	Illinois Motive Equipment Co 39 International Creosoting Co 16	Ohio Brass Co	
Collier, Inc., Barron G	International Register Co 40 International Steel Tie Co Front Cover	The	v
Consolidated Car Fender Co., The	International Harvester Co 25 Irvington Varnish & Insulator		Van Loan Corp., Irving S 41 Versare Corp
Consolidated Car Heating Co 39 Cummings Car & Coach Co 18	Co	P	
	J	Page Steel & Wire Co284B	w
D		Perey Mig. Co., Inc 39	"Want" Ads 41
Day & Zimmermann, Inc 38	Jackson, Walter	Prettyman & Sons, J. F 43	Wason Mfg. CoThird Cover Westinghouse Electric & Mfg. Co.,
Differential Steel Car Co., The. 45 Drum & Co., A. L		e	Second Cover, 4-5 Westinghouse Traction Brake Co. 8
	К	R	Wharton, Jr. & Co., Wm 40 "What and Where to Buy".
E E	Kelker, DeLcuw & Co 39 Kerite Ins, Wire & Cable Co.,	Rail Joint Co., The 45	White Engineering Corp., J. G 38
Earll, C. I	The	Railway Track-work Co 6 Railway Utility Co 45	Wisconsin Power, Light Co 41 Wish Service, The P. Edw 39
	· · · · · · · · · · · · · · · · · · ·		

WHAT AND WHERE TO BUY-Continued from page 44

Troiley Wheel Bushings Star Brasa Works

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.) oring, Testing, etc.)
Thermostats
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co. Peter
Ticket Choppers & Destroyers
Electric Service Sup. Co. Ties and Tie Rods, Steel International Steel Tie Co. Ties, Wood Cross (See Poles Ties, Posts, etc.) Tires

General Tire & Rubber Co General Tire & Rubber Co
Tokens
Johnson Fare Box Co.
Tangue Switches
Wm. Wharton, Jr. & Co.,
Inc.
Tool Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Columbia Machine Wks.
Electric Service Sup. Co.
Railway Trackwork Co.
Torches, Acetylene (See Cutting Apparatus)
Tawer Wagons & Auto
Trucks
McCardell Co. J. R.
Tanwers and Transmission
Structures
Bates Exp. Steel Corp.
Westinghouse E. & M. Co.
Track Expansion Jolats
Wm. Wharton, Jr & Co.,
Inc.

Track Grinders
Railway Teackwork Co.
Ramapo Ajax Corp.
Una Welding & Bonding Co.
Track, Special Work
Bethlehem Steel Co.
Columbia Machine Wks.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.,
Inc. Trackless Trolley Cars Brill Co., The J. G. Transfer Issuing Machines Ohmer Fare Register Co. Transfers (See Tickets) Transformers
General Electric Co.
Westinghouse E. & M. Co. Treads Safety Stair Car Step Cincinnati Car Co. Tree, Wire Okonite Co. Okonite-Callender Cable Co. Trimming Materials Chase & Co., L. C. Trolley Bases
R. D. Nuttail Co.
Ohio Brass Co. Trolley Bases, Retrieving
R. D. Nuttall Co.
Ohio Brass Co. Ohio Brass Co.
Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.
Trolley Material (Overhead)
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Wheels (See Wheels, Trolley) Trolley)
Trolley Wire
American Brass Co.
Amer. Electrical Works
American Steel & Wire Co.
Anaconda Copper Min. Co.
Page Steel & Wire Co.
Roeblings Sons Co., J. A.
Trocks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co Trucks, Motor International Harvester Co Truss Planks
Haskelite Mfg. Corp.
Tohing, Yellow and Black
Flexible Varnish
Irvington Varnish & Ios. Co.
Turbine, Steam
General Electric Co.
Westinghouse E. & M. Co. Turnstiles
Electric Service Sup. Co.
Perey Mfg. Co., Inc. Torntables
Electric Service Supplies Co. Unhoistery Chase & Co., L. C. Valves Ohio Brass Co. Westinghouse Tr. Br. Co. Varnished Papers and Silks Irvington Varnish & Ins. Co.

Ventilators National Ry. Appliance Co. Ventilators, Car Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Heating Co. Nichols-Lintern Co. Railway Utility Co.

Vestibule Linings Haskelite Mig. Corp. Welded Raij Joints
Lorain Steel Co., The
Railway Trackwork Co.
Una Welding & Bonding Co. Welders, Portable Electric General Electric Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co. Welders, Rail Joint General Electric Co. Ohio Brass Co. Railway Trackwork Co. Welding Processes and Apparatus Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co. Welding Steel Railway Trackwnrk Co. Una Welding & Bonding Co. Welding Wire
American Steel & Wire Co.
Railway Trackwork Co.
Roebling's Sons Cn., J. A.
Welding Wire and Rods
Page Steel & Wire Co.
Railway Trackwork Co.

Wheel Guards (See Fenders and Wheel Guards) Wheel Presses (See Machine Tools) Wheels, Car Steel & Steel Tire Bemis Car Truck Co. Standard Steel Works Co. Wheels, Trolley
Columbia Machine Wks.
Electric Railway Equipment Co.
Electric Service Supplies Co.
R. D. Nuttall Co.
Ohio Brass Co.
Star Brass Works

Whistles, Air Ohio Brass Co. Westinghouse E. & M. Co. Westinghouse Traction Brake Co. Window Guards & Fittings Cincinnati Car Co.

Cincinnati Car Co.
Wire, Copper Crivered Steel
Page Steel & Wire Co.
Wire Rope
Amer. Steel & Wire Co.
Roebling's Sons Co., J. A.
Wires and Cables
Acme Wire Co.
American Brass Co.
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Kerite Ins. Wire & Cable
Co.

Kerite in Co.
Co.
Co.
Okonite Co.
Okonite-Callender Cable Co.
Page Steel & Wire Co.
Roebling's Sons Co. J. A.
Westinghouse E. & M. Co.



On the Inside Looking Out

Upon the first appearance of the Brill "Car for 1928" in Brooklyn, New York, the riding public expressed unanimous approval of its 42 inch single windows, eight on each side of the car. The full width windshield of plate glass in the vestibule at the front end of the car provides unobstructed vision for the operator. As this windshield slopes outward, body reflections are eliminated so that the customary curtain is not needed.

That the public appreciates this effort to provide maximum vision is apparent from these few comments which are among thousands received from Brooklyn residents—"Fine view," "Windows especially good," "Windows admit plenty of light," "Greater visibility."

This better vision feature is one of the many refinements which make the "Car for 1928" an outstanding achievement in the electric car industry.

The J. G. Brill Company, Philadelphia American Car Company, St. Louis

The G. C. Kuhlman Car Co., Cleveland Wason Manufacturing Co., Springfield, Mass.



"Car for 1928"



PLYME PLYME



On leading Texas lines

ASKELITE and its steel-faced companion, PLYMETL, are in service on practically all the leading properties. For instance, a recent check of HASKELITE users showed nine out of the first eleven lines in Texas. Wherever light weight, strength and beauty of finish are prime requisites, HASKELITE products are favored.

Among the leading Texas lines using HASKELITE

or PLYMETL, or both, are the El Paso Electric Railway Company, Galveston & Houston Electric Company, Galveston Electric Company, Northern Texas Traction Company, The Dallas Railway Company, The Texas Electric Railway Company, the Houston Electric Company, the Beaumont Traction Company and the Wichita Falls & Southern Railway Company.

HASKELITE MANUFACTURING CORPORATION

133 West Washington Street Chicago, Illinois

Railway Representatives:

Economy Electric Devices Co. 37 W. Van Buren St., Chicago Grayson Bros., 600 LaSalle Bldg., St. Louis, Mo. Railway & Power Engineering Corp. Toronto, Ont., Canada





Exterior and interior views of Galveston Electric Co. cor with HASKELITE ceilings built by the American Car Co.

Exterior and interior views of one of 10 cars built by St. Louis Car Co. for the Northern Texas Traction Co. with HASKELITE headlinings and molded







Exterior and interior views of one of 7 cars built by American Cor Co. for the El Paso Electric Co. with HASKELITE ceilings.



ELECTRIC RAILWAY JOURNAL

Graw-Hill Publishing Company, Inc.

FEBRUARY 25, 1928

Twenty Cents per Copy

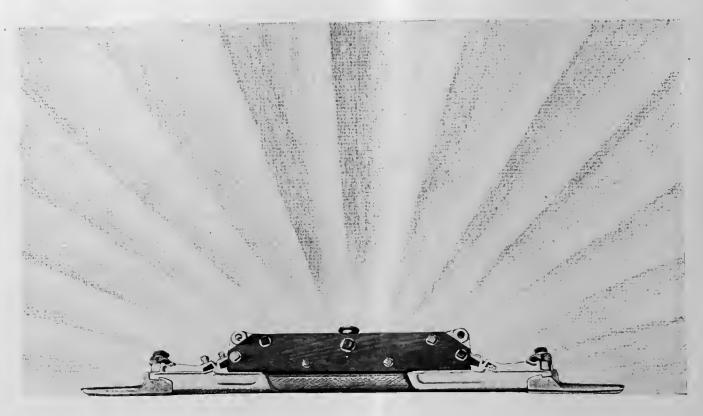


On common carriers Timken Bearings are a common practice. Railroad cars, street cars, gasoline rail cars, gas-electric locomotives and all types of buses are among the Timken-equipped conveyances for mass transportation. For this highly responsible

work, Europe widely capitalizes the engineering excellence which has made Timken Bearings so familiar here. With the longest experience in anti-friction practice, Europe embraces Timken Bearings—produced in Timken Works in England and France.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN Tapered BEARINGS





How Those Rocking Nuts Do Hold!

Less than 12 Pounds But Strong!

TWO light hickory bars held closely together by malleable-iron end castings give the needed strength to the Type EB Single Beam Section Insulator.

Set screws with rocking nuts are inserted in the end castings making it impossible for the trolley wire to pull out. The greater the pull, the tighter the grip.

The insulation runner can be removed and a new one inserted within a few minutes.

All malleable-iron parts are galvanized.

Keep your overhead down by keeping it up with Westinghouse line material.

Westinghouse Electric & Manufacturing Company

East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of





Westinghouse

MORRIS BUCK Managing Editor JOHN A. MILLER, Jr. Associate Editor CLARENCE W. SQUIER Associate Editor G. W. JAMES, JR. Assistant Editor

PLEGIRIC RAILYA

CHARLES GORDON, Editor

HENRY W. BLAKE Senior Editor GEORGE J. MACMURRAY News Editor PAUL WOOTON Wasnington Correspondent ALEX McCALLUM Editoria, Representativa London, England

Vol. 71 No. 8

CONTENTS

125KC/IKI 25, 1928
Editorials
Service First Is Milwaukee's Transportation Slogan310
By Charles Gordon. The Milwaukee Electric Railway & Light Company is making heavy investments in improved facilities to anticipate the transportation needs of its community. Adequate high-speed service is considered vital to the city's present and future development.
High-Voltage A.C. System in Italy
Sell Rides on Low Cost
Laundry Bags Advertise Service
Pittsburgh's Masses Travel by Trolley
Public Approves Interstate's Interurban Cars321
Brady Presentations Made
New Type Street Cars in Holland323
Single-Deck Buses Give Base Service in Atlanta324
Maintenance Methods and Devices325Magnet Valve Gage—By R. S. Beers325Bushing Provides Increased Service for Brake Hangers— By H. C. Pressler325Portable Adjustable Stand for Drill Press326Adjustable Sling for Armature326Bus Cleaning Systemized with Shower Rack326
New Equipment Available327Expansion Boring Bars and Cutters327Portable Tinning, Pot327Thin Wrench for Small Spaces327
Association Activities328
New Englanders Face Industry Problems328 Vital importance of merchandising transportation set forth at Providence meeting. Bus maintenance paper presented.
News of the Industry331
Recent Bus Developments
Financial and Corporate339
Personal Mention
Manufactures and the Markets343

82.6 Per Cent Renew!

EVEN if a publication pleased all of its readers all the time there would be changes in its subscription list. This is particularly true of a business publication, for not only do some of its subscribers retire or die, but some change to other industries, so that the paper serving their former field is no longer of direct interest. Accordingly, a renewal average of more than 70 per cent is considered unusual.

ELECTRIC RAILWAY JOURNAL always has had a high renewal percentage. When some years ago the figure reached 79.5 per cent it was looked on as exceptional. But the record for 1927 has exceeded all previous marks by climbing to 82.6 per cent of the total subscribers.

The JOURNAL is a member of the Audit Bureau of Circulations and the figures quoted are audited by that body.

McGRAW-HILL PUBLISHING COMPANY, INC.

Tenth Avenue at 36th Street, New York, N. Y. New York District Office, 285 Madison Ave. Cable Address: "Machinist, N. Y."

James H. McGraw, President
James H. McGraw, President
James H. McGraw, Jr., V.-P. and Tress.
Malcolm Mulra, Vice-President
Eoward J. Merren, Vice-President
Macon Britton, Vice-President
Edoar Kobar, Vice-President
C. H. Thompson, Secretary

WASHINGTON: National Press Building CHICAGO: 7 S. Dearborn Street

7 S. Desrboru Street
PHILADELPHIA:
1808 Arch St.
CLEWELAND:
Guardian Bulding
St. Louis:
Bell Telephone Bullding
SAN FEANOISOC:
883 Mission Street
London:

LONDON:

§ Bouverie Street, London, E. C. 4

Member Associated Business Papers, Inc.

Member Audit Bureau of Circuistions

Publishers of Engineering News-Record American Machinist American Machinist
Power
Une de de Marche de M Radio Retailing Construction Methods

Electrical West (Published in Son Francisco)

American Machinist-European Edition (Published in London)

The annual subscription rate is \$4 in the United States, Canada, Merico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zons, Hondurss, Cuba, Niesragua, Peru, Cotombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brasil, Spain, Urugusy, Costa Rica, Ecuador, Gustemaia, Chile and Paragusy. Estra foreign postage to other countries \$3 (total \$7 or 28 shillings). Subscriptions may be sent to the New York office or to the London office. Singla copies, postage prepsid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the cld address must be given, notice to be received at least ten days before the change takes place. Copyright, 1928, by McOraw-Hill Publishing Company, Inc. Published weekly. Entered as second-class matter, June 23, 1988, at the Post Office at New York, N. Y., under the Act of March 2, 1879. Printed in U. S. A.

Wheel Re-turning Is An Avoidable Expense



AN irreparable loss occurs every time a car wheel is re-turned. Money has been spent for something that could have been avoided by employing a wheel that needs no re-turning.

Davis "One-Wear" Steel Wheels will never bother the shop for contour conditioning. A special heat-treated composition steel with high wear resistance keeps them in service—releasing money, men and materials for productive work.

AMERICAN STEEL FOUNDRIES CHICAGO



Remember that only 1% saved in operating expense adds nearly 20% to the net. Let O-B Hangers contribute their share.

It's the pennies saved that earn the dollars/



O-B Lock Hanger, Span Type Catalog No. 11062



O-B Spring Lock Hanger, Span Type Catalog No. 14532



BENJAMIN Franklin's teachings are being practiced in the electric railway field! Gradually the industry is realizing that by taking advantage of the many small savings which can be made here and there, the much desired larger gains are achieved.

O-B Hangers for instance, help to make one of these small but important savings. Repeat orders from hundreds of users attest it! With O-B Hangers a permanently tight joint is made between hanger and ear, protecting threads from deterioration caused by rust and vibration. Furthermore, Dirigo insulation prevents line drops and hanger replacements resulting from softening or cracking of insulation and pulling out of hanger studs.

The shock-absorbing O-B Spring Lock Hanger is especially noted as a money saver. The steel spring washer construction in this hanger prevents cupping of the trolley wire at middle and ends of ears. It assures longer life and trouble-free service not only for the hanger itself, but also for ears, trolley wire and trolley wheels.

Ask your O-B Salesman for full details. Or send a trial order and be convinced.

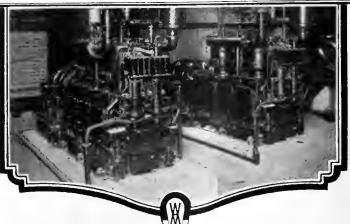
Ohio Brass Company, Mansfield, Ohio Canadian Ohio Brass Co., Limited Niagara Falls, Canada



PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS CAR EQUIPMENT MINING MATERIALS VALVES



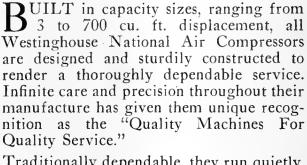
Many traction properties are using Westinghouse-National compressors exclusively in their shops and power houses.



Typical power house installation showing two type "3VS" Westingtype "3VS" Westing-house-National Air Com-

There is a Westinghouse National for *every* pneumatic requirement

Type "2V" compressor... 75 to 150 cu.ft. displacement is fully described in publica-tion T-2047.

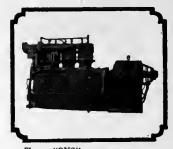


Traditionally dependable, they run quietly, take up minimum valuable floor space, operate economically, and demonstrate conclusively, throughout years of faithful service, their superiority in maintaining maximum pressure for all shop and power house requirements.

Detailed information, relative to the installation of a Detailed information, relative to the installation of a dependable pneumatic source, may be had by writing the Westinghouse Company, or from any of our conveniently located field offices. . . This service is maintained exclusively for the use of those interested in Quality pneumatic systems and is in no way



Type "N" compressor... 12 to 60 cu.ft. displacement is fully described in publica-tion T-2048.



Type "3VS" compressor... 208 to 468 cu.ft. displace-ment is fully described in publication T-2032.

Type "3VD" compressor... 550 to 700 cu.ft. displacement is fully described in publication T-2032.

Westinghouse Traction Brake Co.

obligatory.

Industrial Division General Office and Works-Wilmerding, Penna.

ESTINGHOUSE—NATIONAL Compressors

A Splendid Example of Artistry and Engineering

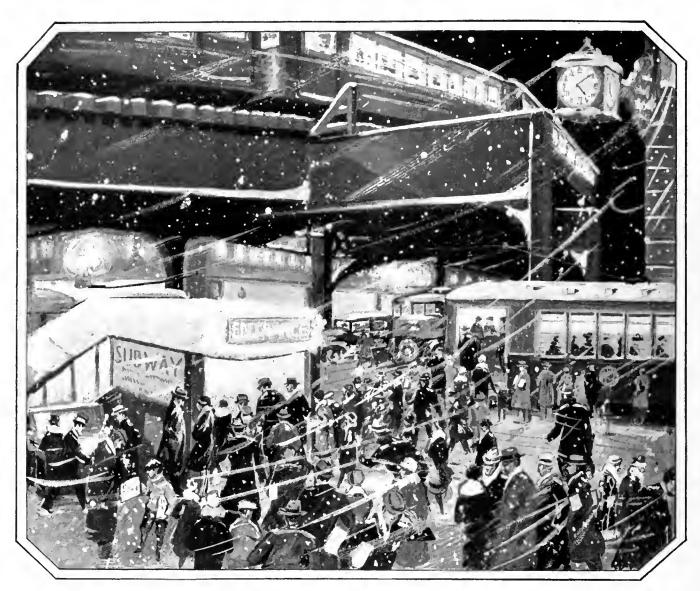


This car has all of the essential features of a modern car—speed, safety, comfort, earning ability, and appearance.

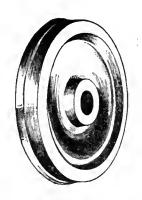
Our contribution to these features is as follows: Keystone-Hunter Route and Destination Signs Golden Glow Headlights, flush mounting type Faraday High Voltage Signal System Interior Car Lighting Fixtures

Home office and plant at 17th & Cambria Sts., PHILADELPHIA: District offices at 230 So. Clark St., CHICAGO: 50 Church St., NEW YORK: Bessemer Bidg., Pittsburgh; 88 Broad St., Boston; General Motors Bidg., Detroit: 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.





One Thought-Home; and One Means of Getting There-the Electric Railway



Rush hour traffic....hundreds of men and women pouring forth from office, factory and store....all with a single purpose—to reach home—and a single means of realizing it—electric railway service.

That the public is so seldom disappointed is high tribute to the management of the transit companies and the efficient equipment they select. That Gary Wrought Steel Wheels may be found under so many coaches is a tribute to the design, workmanship and materials that these wheels embody. Our engineers are at your service.

Illinois Steel Company

General Offices: 208 South La Street

Chicago, Illinois



When the frost goes out, and winter's grip releases, then the work begins.

Prepare now! Don't wait 'til April to plan the program. Line up the welding proposition now. Remember that Thermit welding today is cheaper, simpler and better than ever before. Get quotations and details on the Thermit proposition, and compare them with any other method of joining rails.

Think of Thermit as the process that ends the joint problem by ending the joints. A Thermit weld eliminates the joint and makes one solid piece of rail.



As they do it in Birmingham, Ala. without delaying traffic

The new rails are aligned on temporary ties alongside the track in lengths varying from 2,000 to 4,000 ft. They are then welded, 45 to 70 welds being made in each rail, and the welds ground. They are then "snaked" into position next to the old running rails and spiked down to gauge. It is then a simple matter to divert traffic from the old running track to the new, not more than five minutes being required for this operation.

Scores of other installations of Thermit Insert Welds are recorded in our files. Let us answer your questions.



METAL & THERMIT CORPORATION?

PITTSBURGH

CHICAGO

BOSTON

SOUTH SAN FRANCISCO

TORONTO



Safety Cars are giving a noteworthy impetus to transportation service on leading railway properties.

Quicker Transportation

with SAFETY

Some factors that help speed up transportation service are . . . short headway between cars to reduce waiting time of patrons . . . quick brake application to reduce time consumed in making stops . . . rapid interchange of passengers to cut down standing time . . . prompt release of brakes to permit quick get-away.

The Safety Car Control Equip-

ment enables these vital factors to be combined with the basic element of safety. It brings economic advantages that warrant additional cars . . . assures the quickest possible brake action . . . provides the maximum convenience and flexibility in controlling entrance and exit . . . safeguards operation by interlocking power, brakes, and doors, and by centralizing responsibility.



TYLES IN TRACK CONSTRUCTION

(5)

This is No. 5 of a series on paved track design with STEEL TWIN TIES as used in over 45% of the cities of over 200,000 population in the United States. No. 6 will oppear in an early issue.

10.7



No. 1 Cincinnati

TODAY

No. 2 Boston

No. 3 Detroit

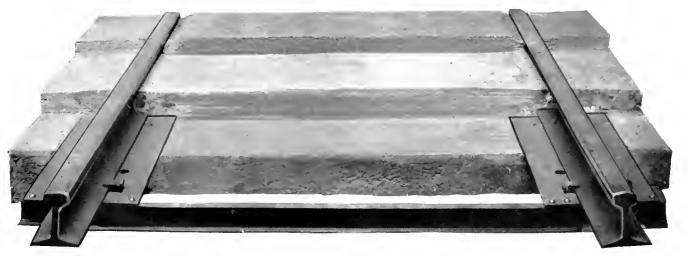
No. 4 Philadelphia

No. 5 Kansas City

No. 6 Cleveland

No. 7 Washington

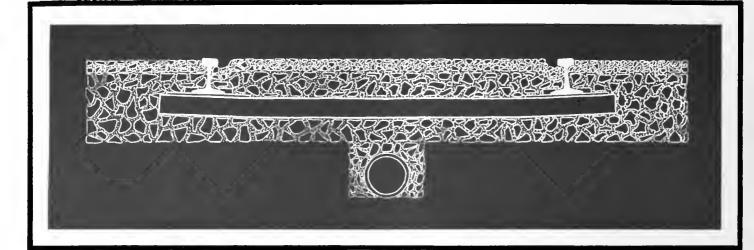
No. 8 Buffalo





STEEL TWIN TIE TRACK
THE BASE OF MODERNIZATION

In Kansas City



STEEL TWIN TIES, which are standard for the \$6,500,000.00 reconstruction program in Kansas City, are furnished with the ends bent upward to cant the rails 1 in 25 and are punched for 90 lb. ARA Type A rail. The rails are Thermit welded and the track is paved with a 1-2½-3 concrete, laid immediately after the base, and monolithic with it. This work has all been under the supervision of Wm. G. Woolfolk & Company, Inc., Engineers and Constructors.

Complete detailed drawings and specifications together with a description of the labor saving methods and equipment utilized in this large program will be sent on request.

Engineers of The International Steel Tie Company have played no small part in the design of better, more lasting track. We have in our files a fund of data on paved track construction that is at your disposal. We will be pleased to discuss with you your paved track problems, and to help you start your modernization program right. Steel Twin Ties are the first step toward better service, and lower initial and maintenance costs.

The International Steel Tie Co. Cleveland, Ohio





and now it's TREADLE-IZE.

Let the N.P. Treadle work for you this year—Treadle operation is circulating load operation

CONSTANTLY



NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works: Rahway, New Jersey

CHICAGO 518 McCormick Building MANUFACTURED IN TORONTO, CANADA, BY Railway & Power Engineering Corp., Ltd.,

PHILADELPHIA
1010 Colonial Trust Building

Once more let us the "BALANCED



The Balance of Speed with Stopping Power

Speed is essential to today's transportation services. Balanced speed, as it has been developed in Cincinnati Cars, offers the operator three very definite advantages. It gives him a car that can hold its own in traffic, with flashing pick-up and instant, smooth acceleration. It gives him a car that can do 60 miles an hour if necessary on the interurban run. And it gives him the Cincinnati Duplex Air-Magnetic Brake which balances this speed with ability to stop in emergencies from 30% to 60% quicker than with air alone.

The Balance of Capacity with Comfort

Cincinnati Curved Side Construction results in approximately seven and one half inches extra inside width at the belt line, without taking anything from wagon and roof clearances. In consequence, Cincinnati Cars carry a full load with a great deal more comfort for the passengers, and with better facilities for rapid loading and unloading.



explain CAR"





The Balance of Lightweight with Strength

Cincinnati methods of car building are as modern as the cars they produce. Such important improvements as the Cast Aluminum Sectional Side Frames, and simplified structural design, using new light weight steels and alloys, have resulted not only in a much lighter fabric but also in a much stronger one.

Cincinnati was one of the first to advocate lightweight cars more than 12 years ago. Cincinnati Cars today have as low a weight per seated passenger as is compatible with the requirements of economical service.

The Balance of Beauty with Low Costs

It is generally recognized that Cincinnati Cars have exceptionally fine lines and a very attractive appearance, both inside and out. We have been very careful, however, to balance beauty of design and finish with practical utility, from the viewpoint of combined economy in maintenance and low depreciation. No detail which might contribute to passenger comfort has been omitted; no feature of sound merchandising value left out.

As you buy it, designed and built under our supervision, the Cincinnati Balanced Lightweight Car is a unit of definitely proved earning power.

Cincinnati Car Company
Cincinnati, Ohio

CINCINNATI BALANCED LIGHTWEIGHT

BALANCED CARS

—still a step ahead of the modern trend



Under Rush-Hour Loads—

How about your wheels?

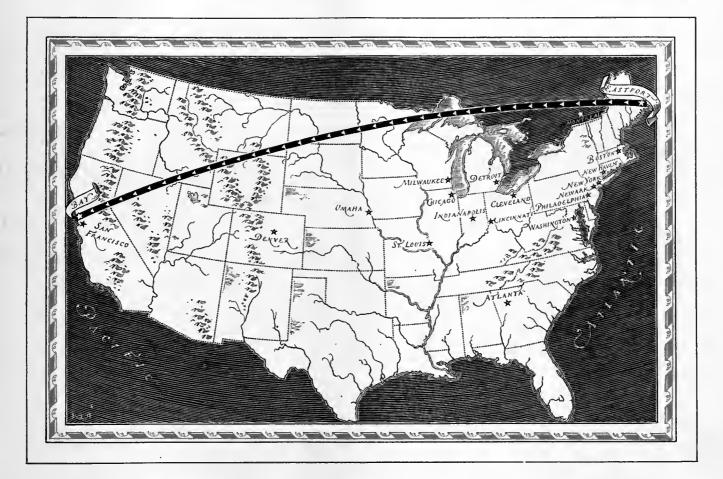
Every system has its rush-hour peaks—times when passengers expect maximum service—and times when operation is hardest on equipment.

"Standard" Axles, Wheels and Springs are chosen for large numbers of modern cars because they have that reserve service necessary for rush-hour operation.

WORKS: BURNHAM, PA.



The longest station to station call within the U.S. now costs only \$10



An Advertisement for Bell Long Distance Telephone Service

The longest telephone call you can make within the U. S. is from Eastport, Maine, to the town of Bay, California. Under the new rates, the station to station day charge for this call is now only \$10.

More than ever you will now be surprised how little long distance calls cost. Business more and more is using the long distance telephone to save trips, buy and sell goods, make appointments and collections, get important things done on time.

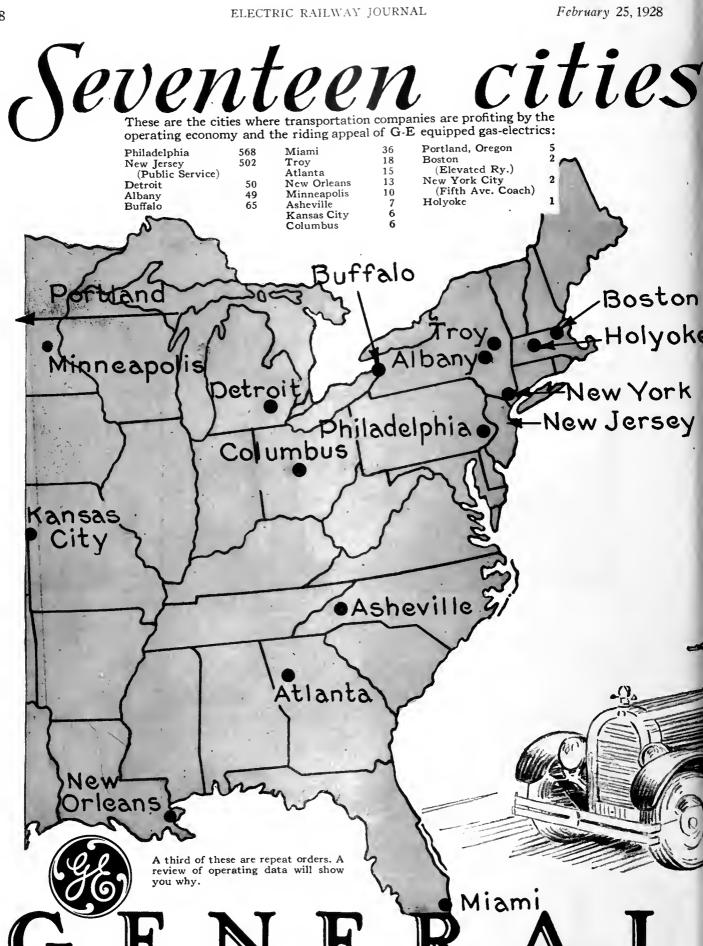
A New York company made 14 long distance calls to department stores in 13 cities and sold \$37,320 worth of specialties,

"all of the transactions having been started and completed by Long Distance at a very nominal cost." A firm of Toledo brokers in one year sold \$5,000,000 worth of produce by long distance calls. "Seventy-five per cent of our bean business is done over the telephone. . . . We can get in closer touch with the buyer and understand conditions at his end of the line." In eight months, a tire concern sold \$3,180,000 worth of tires by telephone at a sales cost of 2%.

What far-away calls could you profitably make, now? Just ask for the long distance operator and place your call by number . . . it takes less time. . . Number, please?

GENERAL

ELECTRIC



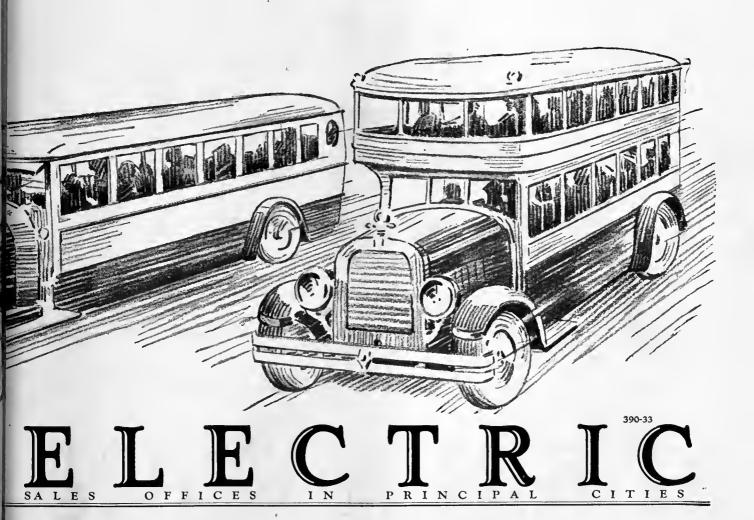
COMPANY.

SCHENECTADY,

are served by iE equipped gas-electric buses

These safe and silent public servants—1355 in number—are, day in and day out, serving patrons of operating companies in seventeen cities and on several interurban routes in the United States.

G-E equipped gas-electric buses have so established their worth in the transportation field that the name "G-E gas-electric" has become almost synonymous with increased revenue, greater availability, and decreased maintenance.





terminal real estate values are increased



Contrast the picture of Grand Central Terminal in 1906 with the present-day view.

Terminal electrification has made the difference. The increase in real estate value is so stupendous that accurate figures are hard to believe.

Actual operation is proving the worth of electrification.

Seventh of a series depicting actual operating experiences on well-known electrified railroads.

350-17

AMERICAN LOCOMOTIVE GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, February 25, 1928

Number 8

Cause for Congratulation but Not for Rejoicing

SENATOR WALSH'S proposal for a senatorial inquiry into the public utility and closely allied corporations has been denied. Instead the Federal Trade Commission will act in the matter. While the trade commission will be under pressure, the case will be conducted along judicial lines and not along the lines of prosecution. As *Electrical World* sees it, the outcome of the matter should be an occasion for congratulation but not for rejoicing, for the desire of the commission to bring out all the facts will inevitably elicit much irrelevant, biased and misleading testimony which will be read by many who will not read that on the other side.

For three days the Senate debated, without eliciting one constructive thought or any good reason, for that matter, why there should be any investigation. During this time passion instead of reason marked the consideration of the resolution and Senator George's amendment to it. Those who sought to place the investigation in the hands of the Federal Trade Commission were accused by inference of being bought by utility money; the Trade Commission itself was charged with incompetency and said to represent "big business" only, and as for the executives and others of the utility industries involved, they were all lobbyists. Obviously, from a public utility angle the situation was anything but reassuring, and the Senate did well, in vindication of itself as well as in justice to the utilities, to turn the matter over to the Federal Trade Commission. There the complete story may be told-and the record can speak for itself.

The utility companies of this country are entitled to a fair hearing, and the submission of their case to the Federal Trade Commission would indicate that the Senate of the United States means that the utilities shall have it. When the case will end and what the final judgment is to be will be revealed in due season. The verdict should be one of exculpation and reassurance. If the case of the utilities is properly presented, no other outcome is thinkable.

Little Things That Make Friends

"W AIT FOR PASSENGERS," a wise edict of an even wiser management, issued recently during a persistent stretch of cold weather in Omaha, had telling effect as letters to the newspapers of that city testify. In this instance motormen and conductors were instructed to hold cars for those hurrying to catch them and were told that under the unusual circumstances prevailing "a few seconds lost in schedule time in this way are conpensated by the appreciation the passenger shows for the friendly act." Not long before this order was issued the same railway opened a bureau to receive patrons' complaints and suggestions for the improvement of service and gave proof of its good faith by co-operating with

a worthy idea—that of supplying extra railway service for the convenience of workers in a packing plant.

There are, of course, many companies with officials sufficiently progressive and far-seeing to evaluate highly the countless little acts of service and courtesy that make the patron feel the company is something more than a machine. And these little acts are bound up with the personal equation, so that if John Jones and Mary Brown benefit today and not on some future day, perhaps after a franchise ordinance has passed through its various stages, necessarily some advantage accrues to the railway. Even if the letter of the law is observed in matters of physical equipment and other details, the spirit must be present in that railway management whose chief concern is winning riders and making friends.

When the motorman who has passed up a passenger becomes to the man left waiting in the street a fiend laughing in ghoulish glee at his discomfiture, then a potential friend of the company all too often becomes irascible and articulate in his condemnation of the public servant and of the entire system. Here then is a liability that even the newly upholstered seat in the modern car can not convert into an asset. Even the request of the company to inspect new facilities may bring something of a reproach rather than approval. To bring back the esteem of persons whose friendship has been lost is far more difficult than to establish good repute in the first place, for it is infinitely easier to make friends than to convert enemies into friends.

The Railway Leads the Way in Milwaukee

ONFIDENCE in the future of electric railway transportation stands out strongly in the program of rehabilitation and improvement which the Milwaukee Electric Railway & Light Company has been resolutely pushing forward during the past several years. This company's "service first" slogan, emblazoned in gleaming electric signs, meets the eye in many locations throughout Milwaukee. But a slogan is merely a promise; one must look to more concrete things for its full significance—to the major rapid transit program undertaken to anticipate the city's needs despite public inertia; to improved city service, rehabilitated cars and track, and new equipment offering modern convenience and increased safety; to the comprehensive motor bus system, co-ordinated with the rail lines both within the city and in the surrounding territory throughout the southeastern section of Wisconsin. To these things one must look for a demonstration and interpretation of what the "service first" slogan means in Milwaukee.

It is obviously impossible to finance with private funds a complete rapid transit service for a city like Milwaukee. Nevertheless, the Milwaukee Electric Railway & Light Company has undertaken to provide a high-speed line from the center of the city to the west, connecting with interurban lines leading to Watertown, Burlington and East Troy. In doing this it is endeavoring to demonstrate the value of efficient public transportation. The meteoric rise in popularity of the automobile has for the moment caused the public in Milwaukee, as in many other communities, to overlook the importance of adequate rail transportation. Although heavy expenditures of public funds have been made on street and highway improvement projects, there has been no general policy of planning for mass transportation routes into and within the city. By making heavy investments of private funds to acquire rights-of-way for such routes, the Milwaukee company is endeavoring to bring about adoption of an intelligent community plan before building development in outlying sections cuts off the opportunity of providing such facilities at reasonable cost.

It would have been far easier to have permitted the interurban lines running into the city to have dried up and disappeared through neglect than to have spent millions of dollars in rebuilding and extending them as high-speed railway arteries. But the company was convinced of the value of these lines to the community. It is confident that public co-operation in working out a complete transit plan can be won by demonstrating the company's own faith in the value of rail transportation. In thus undertaking to lead the way toward a sound community transportation policy, the Milwaukee management is putting into concrete practice the promise contained in its "service first" slogan.

Chasing the Ambulance Chaser Out of Business

EFFORTS to drive ambulance chasers out of business have been renewed recently, and there is every reason to believe that they will meet with considerable success. Following closely on the heels of the successful campaign by the Lawyers Club in Milwaukee, a sweeping investigation of ambulance chasing attorneys and activities of casualty agencies has been ordered by the Supreme Court of New York.

The investigation in Milwaukee disclosed that the activities of the ambulance chasers were not only unethical but actually illegal. The courts went over their records and in many instances where there was evidence of malpractice, the cases were either thrown out or the plaintiffs were required to employ new counsel. So great was the publicity given to these proceedings that the

practice now has virtually ceased to exist.

Action in New York has been taken in response to a petition of the bar associations presented by no less a person that Charles Evans Hughes, former Chief Justice of the United States Supreme Court. The petition points out that ambulance chasing lawyers have so systemized their business that they are enabled through the help of hospital employees, ambulance and taxicab drivers and others, to obtain immediate information of accidents. Claims involving large amounts have got into the control of unscrupulous lawyers who have proceeded to settle them for their own benefit rather than that of their clients. Many poor and ignorant people have been victimized. To help them to relieve court congestion, and to aid the good name of the legal profession, the New York bar associations hope to have the practice stamped out. If this is done the local transportation companies will also benefit greatly.

The investigation has already been formally opened.

The Supreme Court has appointed one of its justices to conduct the inquiry and has armed him with power to summon witnesses, compel testimony, and investigate the books of attorneys and accident insurance companies. This proceeding is based on the right of the Supreme Court to exercise control over attorneys and counsellors at law. Many prominent lawyers in New York City have volunteered to give their time to further the purposes of this investigation. Owing to the well intrenched position of the ambulance chasers it is expected that the campaign against them will meet with strenuous opposition and may require as long as a year for its completion. No doubt exists, however, concerning the final outcome. In the end the practice will be stamped out as effectively in New York as it has been in Milwaukee.

Bus Fare Must Be Made Adequate to the Service

ENERALIZATIONS are always dangerous, but D. E. Druen, superintendent of bus maintenance of the Kansas City Public Service Company, was right when he said at the recent meeting of the Midwest Electric Railway Association that the average fare now charged on bus operation throughout the country is not only inadequate but is not consistent with the value received. He was also right when he said that a fixed fare is not in keeping with the flexibility of bus operation and will surely work a hardship on both the public and the operator. These points cannot be reiterated too often. There is no disposition at this time to go into the economics of the matter. Neither is there any disposition to upbraid the electric railways for errors of the past. It is to be expected that in a development of this kind conditions arise over which management has little control. The important point now is that past errors should be avoided, particularly in pending franchise negotiations in which the use of the bus seems likely to play a large part.

As pointed out in the Journal for Feb. 11, the fixed fare was always an anomaly, but particularly so in the case of the bus.

Often the presence of jitney competition or the threat of independent bus operation by groups with more enthusiasm than actual knowledge of bus economies, forced the railways to install buses at rates of fare known to be insufficient. The real difficulty in such situations is caused by the inertia of the public mind once a rate of fare has been set. For that reason it is particularly important that the danger of fixed fares be emphasized at every opportunity. As operating experience grows, inadequate fares prove a serious burden to taking full advantage of the new vehicle. It is inevitable where there is an inadequate fare that the service should seek the level of the fare.

Bus operation by the railways has not been more unformly successful because too much has been attempted. The place of the bus physically under railway auspices has been pretty definitely defined, but there is need for greater insistence on the right to adjust fares to particular conditions, with a reservation of a variable fare consistent with the nature of the service furnished and . its class. And in all this discussion the place of the bus in de luxe city and suburban service should not be overlooked. These are merely some considerations that will help to put an end to the period of trial and error with the bus from the standpoint of the ability of that vehicle to pay its way.

Will the Public Pay for Good Transportation?

RECENTLY the Port of New York Authority took a "commuter census" of inbound railway traffic from Long Island, Westchester County and Staten Island into New York City as a step toward planning better transportation in the metropolitan area. Although too early at this time to report on the figures of this survey, it is expected that further evidence will be found that commuters are willing to pay higher fares for better service.

Any such evidence will strengthen the "better service" theory revealed by a similar census taken two years ago by the North Jersey Transit Commission. Figures from the questionnaires returned at that time showed that 57 per cent of the passengers arriving at one terminus pay from 6 to 10 cents extra fare on the Hudson & Manhattan tubes when they could have traveled without extra charge on the ferries. For what did they make the extra expenditure? The question is answered in two words—better service—which, as the New York Herald-Tribune remarked, "is an interesting commentary on the dogma that the public won't pay a cent or two extra for good service."

Experience with Upper Decks on Cars and Buses Should Not Differ Greatly

UPPER decks on buses have largely the same advantages and disadvantages as those on electric cars. There is every reason to believe that, relatively speaking, the use of double-deck buses will decrease.

Where transportation for pleasure is not involved, experience has shown that the single decker is superior in many respects. The principal claim for the double-deck type is large seating capacity. However, the space limitations made it impossible to include entrances and stairways of sufficient width and with low enough pitch to make access easy and loading and unloading rapid. Where stops are frequent and there is any considerable passenger interchange, the standing time is increased seriously and the schedule speed is reduced. Further, the standing vehicles in the street increase the traffic congestion. From the traffic standpoint no really satisfactory one-man double-deck vehicle, either car or bus, has yet been designed.

Where sightseeing is a considerable part of the service, with passengers riding for long distances and desiring a good vantage point above the traffic, there are more reasons for the use of the upper deck. Still another use is on a very heavy traffic route, such as ordinarily would call for two-car trains on a street railway. If relatively few stops were made, as in express service, the double-deck vehicle would not be at such a disadvantage, as operating expenses per seat-mile could be held down.

The latest city in this country to go to single-deck design for its buses is Atlanta. The cost per bus-mile with the original double-deckers was so high that the base service is now being given with much lighter, one-man single-deck buses. The double-deckers are used in special and rush-hour service only.

In Europe, outside of Great Britain, the single-deck bus, like the single-deck car, is the rule. The principal exception is in Berlin, where double-deck buses are employed along with single-deck cars, although in Berlin, as in New York, the bus service is small as compared with that given with surface cars. In several of the largest cities in this country, such as New York, Chicago, St. Louis and Philadelphia, double-deck buses still are used in large number. But for general service, at least in the smaller cities, the single-deck bus offers the opportunity of a lighter vehicle, one-man operation, fewer passengers per bus, fewer stops, and more frequent service.

If Theory and Practice Could Be Brought Into Accord

ONE does not have to agree with all that the Maryland Commission said in its recent fare decision in the Baltimore case to realize that its suggestions about the advisability of revamping the financial structure of the United Railways & Electric Company have merit. The question is how best to do it. There is no doubt that the fare change authorized, although it fell short of what the company desired, will help toward restoring the credit of the company, but no fare change that could be made is a panacea sufficient by and of itself to correct a condition in a financial structure that appears to be inherently clumsy.

Naturally, the commission frowned on the idea of a forced receivership. How the proponents of this idea thought receivership could be forced or what they thought could be gained by it, almost passes understanding. Rightly, the commission held that any such proceeding would mean no good, but only harm for the car rider. The United Railways is anything but insolvent, and the property cannot be confiscated. Until recently the company has been able to pay dividends.

Theoretically the amount of securities which the company has outstanding has nothing to do with the matter, since the value has been fixed upon which the company is permitted to earn a return and the commission has attempted to set a fare that will permit the company to earn on it. Practically, however, it has a very important bearing, particularly on the basis of the relative percentage of one form of securities to another. As the matter stands now, the company has outstanding securities in par value \$12,637,000 in excess of the value fixed by the commission, but in the ratio of funded debt to total capitalization and to value upon which the company is permitted to earn lies the most potent factor at work against the company. The first ratio is approximately 76 per cent, while the ratio of funded debt to the value of the property found by the commission is approximately 90 per cent. The commission believes that the ratio of funded debt to the stock ought not to be greater than 67 to 33 in a company of this sort. Such a structure would of course be fairly comparable to that suggested by the committee of finance of the A.E.R.A. Standing in the way of further financing at reasonable terms to the United Railways is a closed mortgage. In consequence the company has resorted to securing money through the Maryland Electric Railway, which leases its property to the United for a sum sufficient to pay interest on the bonds and provide for their retirement at maturity.

The presentation of the matter in the commission's findings is very interesting. The management at Baltimore may be assumed to be no less cognizant than the commission of the theoretical considerations that ought to be made to apply to this case. Matters for them would be helped greatly if things could be so readjusted as to bring about an approximation of the real and the theoretical considerations.



The high-speed lines that are being developed north, west and south from Milwaukee center in the Public Service Building

Service First

Is Milwaukee's Transportation Slogan

PART I

By Charles Gordon

T IS more than probable that a full realization of what its transportation company's foresight is doing for the progress and future prosperity of Milwaukee, will not be fully recognized for many years to come. That foresight is being backed with the courage to make large investments in improved transportation facilities within the city and in anticipat-

ing the community's expansion and future needs. While many cities in the country are wrestling with the problem of providing fast and adequate public transportation, the lack of which is threatening to stifle their development, the Milwaukee Electric Railway & Light Company is taking the initiative in providing for Milwaukee the backbone for a comprehensive rapid transportation system for the city and contiguous territory.

Millions of dollars have been expended in providing rights-of-way for the conversion of former interurban

The Milwaukee Electric Railway & Light Company is making heavy investments in improved facilities to anticipate the transportation needs of its community. Adequate high-speed service is considered vital to the city's present and future development

lines into grade-separated, highspeed, rapid transit lines that constitute arteries for the expansion of the city and for linking the present city area with the prosperous and attractive surrounding communities and countryside that are logically within the Milwaukee metropolitan district. Milwaukee's transportation company is looking ahead to the part which

these attractive suburban towns and the land of lakes that surrounds the city proper may be expected to play in the development of a greater city. It is anticipating, likewise, the needs of the growing industrial district that lies to the south. On the railway lines within the city heavy expenditures have been made during the past several years for improved street cars and for putting surface track in good condition. There has been built up a comprehensive bus service both within the city and between Milwaukee and other communities in the south-

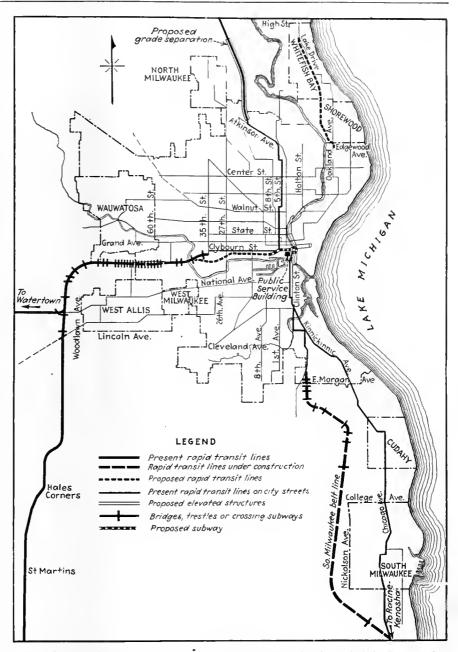
eastern section of the state. All this is being done in the face of public inertia and despite a discouraging financial showing on present transportation operations.

Although Milwaukee County has been liberal in the expenditure of public money for highway improvements, continued increase in road congestion threatens to choke off the city's activities just as growing congestion is doing in practically every large city in the country. Though both the city and county of Milwaukee have a progressive zoning and planning policy looking to future growth and expansion, there has been a tendency, just as there has been in other cities, to overlook the importance of making adequate provision for rapid public transportation. Blinded by the popularity of the automobile, public planning bodies in Milwaukee have failed to recognize the futility of depending upon highway construction for a growing city's transportation requirements.

Milwaukee is fortunate, however, in that its transportation company has had the foresight and courage to go ahead on its own initiative and at its own expense, to provide for present needs and to reserve other important transit routes before the city's growth makes this extremely costly, if not impossible. The company is leading the way in the hope of bringing about ultimately the adoption of a sounder community policy toward transportation. It is proceeding with the construction of rapid transit lines on a scale sufficient to demonstrate the advantages of rapid transportation to the public in the hope that this will win the necessary public co-operation to make a city-wide system possible.

Extensive construction work is under way both west and south of the city and is awaiting only final ap-

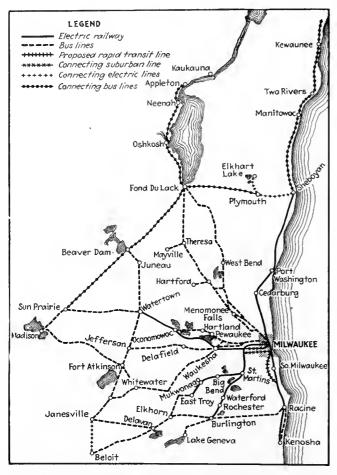
proval of plans for starting grade separation to the north. The program has been developed as part of a comprehensive plan to cover the transportation needs of the entire Milwaukee metropolitan district. The first stage of construction is to provide adequate high-speed outlets for the city's population so as to make available for residential sites the attractive surrounding countryside, which, due to the time required to reach the heart of the city, has hitherto been unavailable for all-year residential purposes. There has already been expended nearly \$5,000,000 in this work. It will take additional heavy expenditures to complete the work now contemplated, and all of this is only the first step in a major program, which, if the city extends the degree of co-operation needed to work out the full plan, will give Milwaukee a comprehensive rapid transit system leading in three directions from the heart of the city through its suburbs to high-speed rehabilitated interurban lines serving outlying cities and towns within a great semicircle of 30 or 40



Map of Milwaukee's city and rapid transit lines. A right-of-way is being acquired to bring the western line to the Public Service Building. Improvements on the north and south routes will insure high-speed service

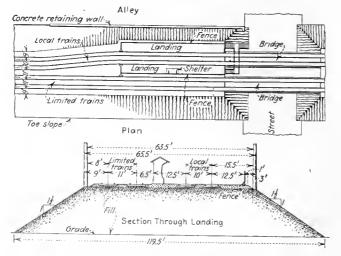
miles radius. From rail heads in these cities there is now a network of luxurious bus lines on the highways throughout the southeastern section of the state.

The program being carried out in Milwaukee with respect to the development of former interurban routes into rapid transit lines is of major magnitude and is in striking contrast to that followed with respect to interurban lines in other locations, particularly those which radiate out from a city into surrounding territory. There has been a general tendency to permit such lines to dry up with neglect. It would have required far less courage and risk to have permitted this to happen to the interurbans operating out of Milwaukee, for their revenues had dropped to discouraging proportions. wound their way haltingly over tortuous track they, like similar lines in other sections of the country, were hopelessly at a disadvantage in competition with fleet and attractive automobiles. There would have been ample justification for permitting these lines, which at one time



Lines of the Milwaukee Electric Railway & Light Company, Milwaukee Northern Railway and Wisconsin Motor Bus Lines serve the entire southeastern section of Wisconsin

played so important a part in the development of Milwaukee, to have eked out a miserable existence until their abandonment was ultimately authorized on the basis of lack of patronage. This would have been the easiest course for the management to have pursued. The growing use of automobiles would have been adequate explanation for the demise of the lines. There would have been adequate precedent for such a policy in that followed with respect to interurbans in other locations. But



Typical section and plan of station landing showing type of construction on western rapid transit line to Watertown, East Troy and Burlington. These are taken between Hawley Road and 68th Street, where the last link in the line west of 35th Street is now being completed

the Milwaukee Company did not choose to follow such a policy. It took real courage to follow the one adopted. If the public ever really understands the full value of this program to the city, the management's "Service First" slogan will take on new significance.

So much, then, for the background of what is being done in Milwaukee. The actual construction work which is completed, under way or authorized, will bring the lines from Watertown, East Troy and Burlington, located west and southwest from the city, into a downtown terminal in the Public Service Building over a high-speed, grade-separated, private right-of-way to a point within a few blocks of the terminal, and thence through a short subway into the terminal itself. A loop is to be constructed under adjacent property owned by the company so as to provide terminal facilities ample to turn trains around without stub-ending and to avoid terminal congestion.

The first step in the construction of this western rapid transit line was the building of a line on private right-of-way from 35th Street west to West Junction, connecting with the Watertown interurban line. This work, together with a connecting line about a mile long between West Junction and the Burlington line, which was described in the June 18, 1927, issue of Electric Railway Journal, involved long bridges, high embankments, deep cuts and expensive trestle and bridge work. All of the construction from 35th Street west has been completed with the exception of a stretch from Soldiers Home to 70th Street. When this is completed, cars from Watertown, East Troy and Burlington will be brought 6 miles into the city on high-speed line with no grade crossings.

The construction work which is now under way from Soldiers Home west to 70th Street consists of track relocation on private right-of-way, grade separation at all important intersecting streets, and closing unimportant streets and alleys crossing the right-of-way. East of Hawley Road a depression starts which passes under Hawley Road and 60th Street, emerging at grade between 61st and 62nd Streets. From this point the line becomes elevated as it continues west, and finally connects with the present completed embankment structure now located west of 70th Street. This section between Soldiers Home and 70th Street will provide a fourtrack, grade-separated line, two tracks being for local service of the Wells-West Allis car line, and two tracks for high-speed express operation. The construction involves the moving of 100,000 yards of material for cuts and fills. West of Hawley Road the line is built on solid embankment with steel deck and through girder bridges over street crossings. Where the line passes under streets in cuts, concrete bridges are used to provide grade separation.

High operating speed with adequate safety is the primary object in all new construction and rehabilitation work. Heavier rail has been put in on the Watertown interurban line which connects with the rapid transit line at West Junction and extends to Watertown on private right-of-way. All 56-lb. rail was replaced with 80-lb. steel. The line has also been reballasted with crushed stone and gravel which will ultimately be all stone to insure alignment and freedom from frost trouble. A reballasting program is likewise being undertaken on the East Troy and Burlington interurban line, which, instead of having a tortuous entrance to the city over city streets, was connected to the rapid transit line last spring by the new cut-off mentioned above. New terminal stations





have been built in Watertown, Burlington and East Troy. These are arranged so that passengers can transfer directly under cover between buses and cars.

To complete the western rapid transit line from 35th Street east into the Milwaukee Public Service Building, property has been purchased to a point within a short distance of the terminal. Application is being made for permission to build a short subway to complete the connection which will give Milwaukee a complete rapid transit outlet from the city to the west and southwest. The final stage of construction awaits only completion of negotiations with the city and Railroad Commission.

South from the city there is under way the construction of a belt line around South Milwaukee and Cudahy, approximately 10½ miles long from Howell Avenue and Wieben Street to the Ryan Road crossing on the interurban line to Racine. A 3-mile industrial electric railway from the Chicago, Milwaukee, St. Paul and Pacific Railroad to the Lakeside power plant is also under construction south of the city.

This southern belt line will cut out the present slow running section of the Milwaukee-Racine railway along the highway and in the streets through South Milwaukee and Cudahy. It is estimated that this improvement will decrease the present running time to Racine by approximately thirty minutes. The belt line will consist of about 1½ miles of double track south from Howell Avenue together with a double-track running siding about midway on the line. The balance of the construction

will be single track.

The double-track section will be elevated or depressed from grade on private right-of-way with steel bridges for highway crossings. The single-track part of the line will be at grade on private right-of-way and will be depressed under the Chicago Avenue crossing. Wherever practicable, on the remaining line, highways will be elevated over the track on highway bridges. The elevated section of the line will be on solid embankment. It will require eight steel bridges for the section from the beginning of the private right-of-way southbound, to the depression under Chicago Avenue. The track will be laid with 100-lb. A.R.A.-A rail, with continuous joints, heat-treated bolts and tie plates throughout. The entire line will be rock ballasted and will be laid on cedar ties on tangent track with creosoted oak ties on curves. Adequate provision will be made for future local station platforms and waiting shelters at car stop intervals of about one mile.





Construction on the Rapid Transit Line to Watertown is designed for high speed operation

- No. 1. Train passing Waukeshaw Gravel Pit substation.
- No. 2. Right-of-way under concrete bridge at Soldiers' Home
 - No. 3. Typical solid fill embankment.
 - No. 4. Cut at Greenfield Avenue looking north.



350

300

ď

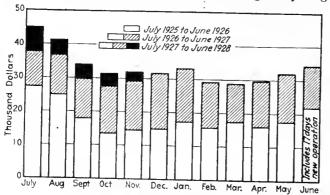
100

Steel bridges are being provided over all principal street crossings on Milwaukee Rapid Transit Line. Construction shown is on new work between Soldiers' Home and 70th Street

To the north of the city steps are under way to insure an outlet for Milwaukee's future rapid transit system over the present Milwaukee Northern line, which now comes into the outskirts of the city on a double-track private right-of-way and reaches the heart of the city over city streets. Work projected for the immediate future involves extensive grade separation made necessary by the expansion of the city to the north, which has taken in additional territory that has been plotted for subdivision and home construction. Plans for this subdivision work would have relegated the rail lines now on private right-of-way to a position in the center of a public street. For that reason immediate expenditures for grade separation work are to be undertaken in order to preserve a high-speed outlet to the north. The work which will be done immediately includes about 3 miles of combined track depression and elevation to give grade separation. Application has been made to the State Railroad Commission for approval of this work, and conferences are being held with county and city officials to agree upon a final plan that will be satisfactory.

Another example of the Milwaukee company's progressive policy in making every possible effort to anticipate the city's needs in transportation is afforded by the plan proposed in the northeast section of the city, in a very high grade residential district. Here a line of the Northwestern Railroad, part of its Manitowoc division running through the towns of Shorewood, Whitefish Bay and the southern end of Fox Point, is to be abandoned through an agreement with the villages. Abandonment of the railroad would cause some titles on the right-ofway to revert, and would result in cutting off this available route for present and future transportation.

Realizing that if this is permitted to occur, these communities would cut themselves off from all possibility of rapid transportation to the center of the city, the company, in accordance with its policy of doing everything

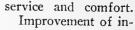


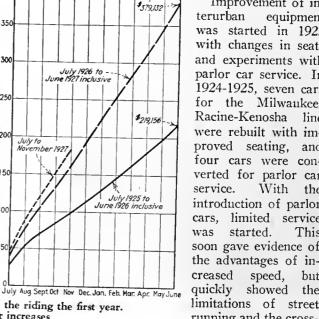
possible to insure the preservation of routes for future transportation requirements, has offered to electrify this abandoned line and to operate service over it to preserve the right-of-way. It has offered, further, to undertake expensive grade separation work at important cross streets. This project has been placed squarely before the officials of the communities involved.

HIGH-SPEED CARS PROVIDED

The conversion of old interurban lines running out of Milwaukee into a network of high-speed lines serving the entire metropolitan area surrounding the city and outlying sections tributary to it, has been accompanied by improvements in rolling stock in keeping with the changed standards of operation. The rapid spread of competing interurban bus lines and the increased competition of the private automobile led to the conclusion that the interurban lines under the old operating standards were either doomed to early abandonment or that they must be promptly brought to a new standard of

> terurban equipment was started in 1922 with changes in seats and experiments with parlor car service. In 1924-1925, seven cars for the Milwaukee-Racine-Kenosha line were rebuilt with improved seating, and four cars were converted for parlor car With the service. introduction of parlor cars, limited service was started. soon gave evidence of the advantages of increased speed, but quickly showed the limitations of street running and the cross-





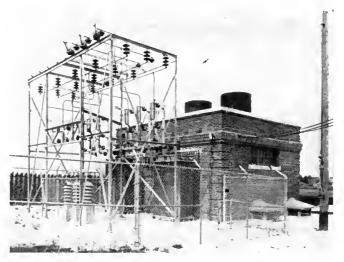
Improved service on the Watertown line almost doubled the riding the first year. The second year's operation is showing further increases

ing of many streets and highways at grade. It was this early experience in the effort to give a better service out of Milwaukee that ultimately led to the present major program of building high-speed lines on private rights-of-way with equipment designed to permit fast running with comfort and safety to passengers.

A number of existing interurban cars that had the necessary structural strength were rebuilt for the new service. They were completely refurnished and equipped with new trucks and motors suitable for high-speed running, and with multiple-unit control and modern air brake equipment to permit the operation of more than one motor car in a train. In all, 31 motor cars and ten trailers have been rebuilt for high-speed rapid transit service, and four entirely new motor cars have been purchased. A new articulated unit for service on the Milwaukee-Watertown line has been built in the company's shop. * This is a combination dining car, passenger unit with two bodies and three trucks, providing communication between the dining and passenger compartments. It was placed in service between Milwaukee and Watertown, on Jan. 16, and makes direct connections at Watertown with parlor coaches to Madison, the state capital.

The rebuilding of interurban cars consisted of reinforcement of the bodies, insulation against noise, improvement of the lines and general appearance, new interior finish, installation of improved lighting equipment and de luxe leather upholstered bucket type air-cushioned seats. New standard steel, M.C.B. trucks of 7-ft. wheelbase, in which special attention was given to riding qualities, were purchased. Old GE-205 motors were replaced with GE-254, 140-hp. motors and Westinghouse 548, 105-hp. motors. The gear ratios and field control that are provided permit operation with a trailer at free running speeds of 60 m.p.h. M.C.B. couplers and A.M.U. air brakes are used.

Before the rehabilitation of the lines to Watertown, Burlington and East Troy, operation had been on 1,200 volts direct current from manual substations located at West Allis, Waukesha, Waukesha Beach and Watertown on the Watertown line, and at Burlington and East Troy on the Burlington and East Troy lines. There were substations only at the ends of these three divisions, with intermediate stations on the Watertown line at Waukesha and Waukesha Beach. The West Allis station fed to all



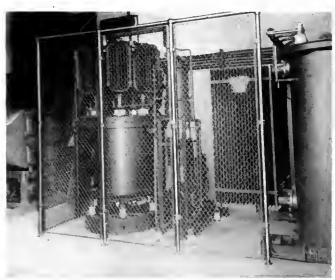
The St. Martins rotary substation is a two-unit installation with full automatic control

three lines from a common point near their entrance to the city.

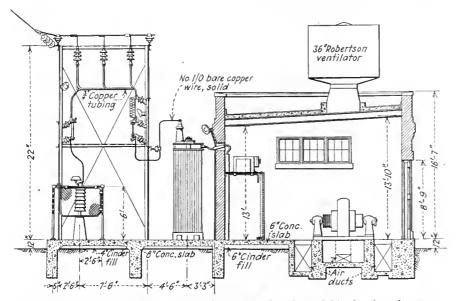
The new power supply is 600-volt direct current from substations, spaced at frequent intervals to insure adequate trolley voltage with minimum line drop for highspeed trains. The former 1,200-volt substation at West Allis was converted to 600-volt operation and contains one 2,000-kw. rotary, one 1,000-kw. machine and one of 500-kw. capacity. This station is manually operated and feeds both to the Watertown line and the Burlington-East Troy line from a point in the outskirts of the city near the junction point of these routes. The power supply is from the high-tension transmission lines of T.M.E.R. & L. Co., some of which use the railway rights-of-way for power transmission to points in the state west and southwest of Milwaukee. At West Allis the railway power supply is received at 66,000 volts, 25 cycles. This same condition exists at the other old stations which have been changed over from 1,200 to 600volt operation; namely Waukesha, Waukesha Beach, Watertown and at stations on the Burlington-East Trov

The Waukesha station on the Watertown line is a full automatic station with two 500-kw. Westinghouse,





Three of the new substations on the Watertown Line are equipped with mercury arc rectifiers. The exterior of the Nemahbin and interior of Pipersville stations are shown



Section through typical new automatic rotary substation. This drawing shows arrangement of St. Martins, two-unit station

25-cycle rotaries and Westinghouse automatic control equipment. The next station on this line, Waukesha Beach, is a manual station with three 500-kw., 25-cycle G.E. rotaries. The next three stations on the Watertown line, namely Nemahbin, Oconomowoc and Pipersville, are all mercury arc stations with automatic control, each containing one 550-kw. Brown Boveri mercury arc rec-Simple and compact concrete block buildings house these stations, which have outdoor switching equipment. An interesting feature of the installations is the recirculation of cooling water, using fan cooling, due to the lack of a water supply for cooling the rectifier units. The general appearance and arrangement of these stations is shown in accompanying illustrations. The last station on the Watertown line is at the terminal. This again is a converted, former 1,200-volt station and contains four 300-kw. 25-cycle G.E. rotaries operated manu-

On the Burlington-East Troy line, a new full automatic substation was built at the junction point of the Burlington and the East Troy divisions at St. Martins. This station contains two 500-kw. Westinghouse rotaries with Westinghouse control equipment. From this point



Comfortable seats, easy riding at high speeds and cheerful illumination feature the cars used on the rapid transit lines out of Milwaukee

on the Burlington division, new stations were built at Wind Lake and at Waterford. Each of these contains one 500-kw. G.E. rotary with Westinghouse full automatic control. At the end of the Burlington division the Burlington station, which was converted from 1,200-volt operation, is manually operated and contains three 500-kw., 25-cycle G.E. rotaries.

three 500-kw., 25-cycle G.E. rotaries. Leaving St. Martins on the East Troy division, there are two new automatic stations of similar design at Chamberlain and Mukwonago respectively, each containing one 500-kw. Westinghouse rotary with Westinghouse control equipment. At East Troy the station was formerly operated at 1,200 volts. It has been converted to deliver trolley current at 600 volts, and contains two 300-kw., 25-cycle G.E. rotaries with full G.E. automatic control equipment, and two

300-kw., 25-cycle G.E. machines operated manually.

The two-unit automatic substation at St. Martins is typical of the type of construction used for the new rotary stations. As shown in an accompanying illustration the building is of simple design in pressed brick, with one large central door. On the interior, a slate panel switchboard occupies practically the entire wall opposite the door. This carries the conventional equipment of meters and automatic control relays. 500-kva., three to six-phase transformers are located outside the building. Here also, are grouped a bank of auto valve lightning arresters, the disconnects, fuses, choke coils and framework for the high-tension circuits. All the outdoor apparatus is inclosed with a sturdy cyclone wire fence. Several light units are mounted at different levels on the switch framework to provide illumination for emergency night work.

A number of windows placed in either end of the station admit light, but circulation of air for ventilation is cared for by special air inlets and two 36-in. Robertson ventilators on the roof. Particular consideration was given to the problem of circulating cool air through the rotaries. For each machine two ducts bring in air from the outside near the ground level of the building and deliver it to the machines through gratings directly alongside the bearing pedestals. Protective horizontal hoods and fine screens completely covering the three exposed sides of the air inlets shield them from surface dirt, rodents, etc. Another set of gratings located in the station floor in line with the field frame, serve as vents to prevent trapping of hot air in the frame pits. In general, the trolley wires are paralleled by 500,000-cir.mil copper or equivalent aluminum auxiliary feeders.

All single track on the Watertown line, on the Southern Belt line and on the Milwaukee Northern line, is protected by Nachod block signals. Similar protection is provided on the Burlington-East Troy line south to St. Martins. At all important highway crossings on the interurban lines of the company, there have been installed either wigwag or flashing light type of highway crossing protection signals.

The Milwaukee company's "service first" slogan as reflected by improvements in city service and the development of a comprehensive co-ordinated bus service will be discussed next week.

High-Voltage A. C. System in Italy

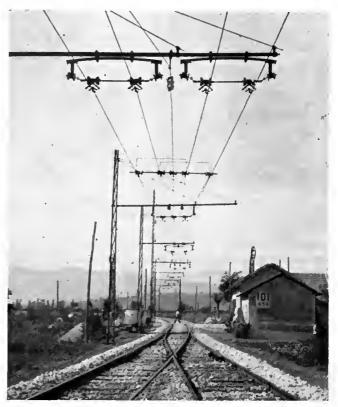
Three-phase alternating current at 42 cycles and 10,000 volts between the two overhead contact conductors employed by the Italian State Railways on an experimental line

By Kent T. Healy

Research Associate Yale University, New Haven, Conn.



Semi-rigid ears fastened to insulators on a transverse rod support the contact wires on curves



Main line switch for 10,000-volt, three-phase distribution system of the Italian State Railways

ERTAIN conversion disadvantages of the low-voltage three-phase system have caused the Italian State Railways to experiment with two new systems of electrification. The first of these, high-tension direct-current, is being tried near Naples. The second, a three-phase alternating current system at a frequency of 42 cycles and 10,000 volts between the two contact line conductors over each track, is being tested on the 107-mile line from Rome to Sulmona. This article treats of the construction of the second-named experimental system of electrification. It had not been put in operation at the time of the writer's visit to the property last October.

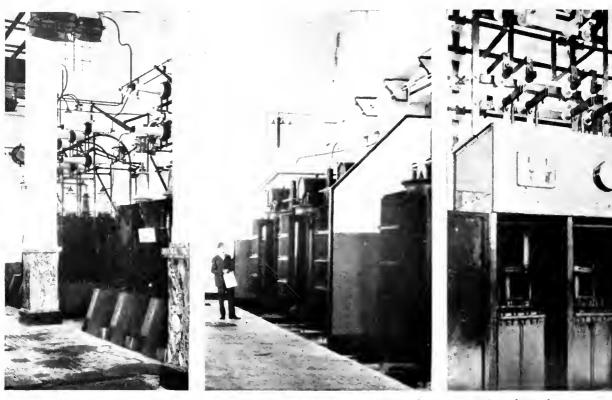
Energy is received at 60,000 volts and stepped down to 10,000 volts at the substations for distribution. Use of the higher voltage and frequency demanded a different type of locomotive.

The substations are of the indoor type with one room for high-voltage switches, another for the transformers and a third for feeder switches. The transformer equipment includes six 800-kva. single-phase units and one spare. They are protected by an unusual number of choke coils, which are shown in an accompanying illustration. The feeder switches are of a truck type of high capacity.

FOUR TYPES OF OVERHEAD

The contact system is interesting in that four types of construction are used. The simplest consists of two No. 0000 copper conductors, directly supported from brackets at 100-ft. intervals by hard-spot eliminating ears. It is used in the yards, at the stations and on some sections of the main line where speeds are restricted. One of the illustrations shows the use of this type in the yards.

For heavy grade sections of the main line a second pair of feeder conductors is added. The insulation used is below the American electric railway standards for the voltage used and the sectionalization switches, as illustrated, are very close together for horn gap switches. The third type of contact system is the usual catenary with a copper messenger supported by pin insulators and a copper contact wire, pulled to either side by a Hewlett type

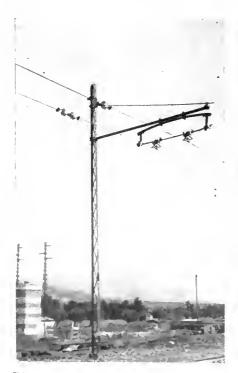


Numerous choke coils in the 60,000-volt switchroom protect the transformers. Portion of transformer room, showing barriers. Three-phase feeder switch for 10,000-volt service

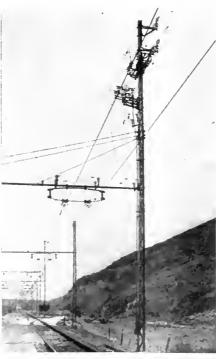
insulator, in series with a special through type insulator. The fourth type of support is a catenary with a messenger on pin insulators and the contact wire pulled off by semi-rigid ears fastened to through insulators on a transverse rod.

Switches are all made with direct suspension whether in main line or yard service because the addition of a catenary messenger would complicate the construction, making it difficult to get satisfactory clearances and insulation.

In conjunction with all direct suspension sections a hard-spot eliminating ear has been developed which allows the contact wire to be lifted by the pantograph as it goes under the suspension point. This adds no appreciable weight to the trolley as it passes beneath. A device similar to this was in use on the low-voltage three-



Direct suspension yard construction using two solid No. 0000 copper conductors



Sectionalization point on 10,000-volt, threephase reinforced catenary for heavy duty



Tangent catenary suspension for high-speed main line, using Hewlett-type insulators

phase lines, having been developed to reduce trolley failure at suspension points.

Fourteen freight and passenger locomotives have been built for this service. Each has two induction motors, with a combined rating of 2,000 kw. By means of pole changing and parallel or cascade connection four running speeds are available on the passenger locomotive up to 62 m.p.h. and three speeds on the freight locomotive up to 47 m.p.h. The wheelbase is of the 1-D-1 type, the motors driving jackshafts through gears and coupled through a Scotch yoke to the four driving axles. The 10,000-volt trolley potential is transformed to 1,000 volts for the motors. Current limitation in starting is effected. by liquid rheostats in the wound rotor circuit. The electrical design has been made with a view to changing to 3,600 volts, 16-17-cycle operation if necessary. diameter of driving wheels of the passenger locomotive is 64 in. and of the freight locomotives 53 in. The diameter of the idling wheels is 44 in. The total weights are 200,000 lb. and 208,000 lb., respectively, with 143,000 lb. on drivers in each.

Many obstacles were overcome in the design of this overhead system for distributing three-phase alternating current at a potential of 10,000 volts. Another problem was the design of the high-frequency motors and their driving system, to go along with the commercial frequency.

Sell Rides on Low Cost

By H. E. JORDAN

Assistant Engineer Los Angeles Raikway, Los Angeles, Cal.

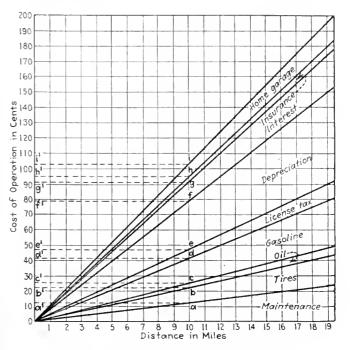
FOUR primary ways exist for selling a commodity against competition: First, make it the most convenient for the customer to buy; second, give more and better service with each sale; third, make the commodity better than any other of its kind on the market, and, fourth, reduce the price of your article below the market price.

While the transportation companies must unceasingly strive to place their commodity so that it may be conveniently purchased, to give more frequent service, to improve the courtesy of their trainmen, and to provide more comfortable riding conditions, they cannot ever hope to equal in these respects the commodity offered by the privately operated automobile. It is this competitor that has made such disastrous inroads in the commercial transportation field today.

Being always at hand when needed, traveling wherever and whenever the owner wishes to go and providing desirable comfort and privacy, the private auto has unquestionably the advantage over the trolley car on the first three points. Electric railways must resort chiefly, then, to selling their commodity at a lower price.

On this score they have a decided advantage over their competitor. This fact is usually admitted. However, transportation companies must sell the idea that this one primary advantage clearly offsets the three others. The companies must capitalize on this argument, just as the auto manufacturers capitalize on convenience, flexibility and comfort.

Many thousands of people drive their automobiles to and from work, or to and from shopping, because they like the service and comfort it renders. They are not bothered about the price they pay. It is too complicated and indefinite for them to figure out, and they continue to deceive themselves from day to day because it is the easiest thing for them to do. It is vital to the trans-



What it costs to drive your automobile to town

portation companies that they make the privately operated automobile rider face the facts.

The accompanying chart, based on a fair average of data, is self-explanatory. A comparison of these data with the rate of fare paid by the average car rider shows that it costs approximately ten times more per passengermile for the privately operated automobile than it does for the street car. This tremendous economical difference certainly should outweigh the convenience and luxury of the privately operated automobile.

It may be difficult to make the public read and believe data of this nature, but it is the business of the transportation companies to make them believe it. If the information were placed in the public's hands and pounded into the public's mind, through newspapers, billboards, talks, etc., until the public admitted it was true, wouldn't there be a difference in the transportation company's patronage?

Laundry Bags Advertise Service

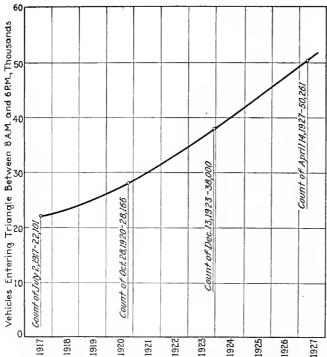
FURTHER details regarding the practice of advertising the high-speed internal tising the high-speed interurban service of the Northern Texas Traction Company, Fort Worth, Tex., on the paper laundry bags of the Adolphus Hotel, Dallas, mentioned in the Journal Nov. 12, have become available. The advertisement shows a view in color of the company's "Crimson Limited," which runs between Dallas and Fort Worth. In addition to the picture the text features the topography of the country traversed and the speed, safety and comfort of the service. Economy of the ride by interurban and convenience of train schedules are emphasized. The contract covers 100,000 laundry bags to be used exclusively in the hotel. It is estimated that this amount will be a sufficient supply for two years. The space on the laundry bags cost \$1,200, at the rate of \$50 per month for twenty-four months. In the event that the bags last over the two-year period the hotel guarantees to use them until the 100,000 are exhausted.

Pittsburgh's Masses Travel by Trolley

Counts show travel into and out of "Triangle" still largely by trolley. Underground tracks recommended in business district

PITTSBURGH, which is the center of a metropolitan community having a population of more than 1,250,000, is earnestly endeavoring to solve its transportation problem. This is especially difficult in that city because, the principal office and financial district is concentrated in a small triangle between the Allegheny and the Monongahela rivers, where they join to form the Ohio.

About three years ago under the direction of the Pittsburgh Traffic Commission and its successor, the City Transit Commission, a rapid transit plan was proposed by Daniel L. Turner, of New York, and Winters Hay-



Graph showing vehicles entering the Triangle of Pittsburgh between 8 a.m. and 6 p.m., on four selected days

dock, of Pittsburgh (see Electric Railway Journal, March 14, 1925, page 409). The plan suggested was approved by the City Transit Commission and a bond issue was authorized by popular vote to construct the first section of the system. It was to be a subway in the congested district and used by the surface cars. Construction has been delayed, however, due to the desire of the city to employ the assessment principle in the financing of the system. A constitutional amendment to authorize this method in Pittsburgh was passed by the General Assembly in 1925, but it still has to be approved by the voters of the state at an election to be held in November, 1928.

In the meantime the City Transit Commission has been making a detailed survey of surface and underground conditions as a preliminary. It has also seen that the foundations for several new buildings in the downtown area, including the piers for a new bridge across the Allegheny River, were so designed that they would not interfere with the construction of the proposed subway.

The annual report of the City Transit Commission, dated Dec. 22, 1927, outlines some of these activities as well as the result of some recent studies made on Pittsburgh traffic conditions.

The report declares that the problem of street traffic has attained such overwhelming proportions with such suddenness that few cities in the country are prepared to cope with it. This condition is the outgrowth of only two decades of developments in the automobile industry. The fundamental difficulty is that the street systems of all large cities are designed for a horse and buggy civilization, and many of them, including those in Pittsburgh, were very poorly designed for the purposes of even that past era. In the meantime the rate of increase in street traffic congestion is much greater than the rate of increase of population. The proportion of persons owning automobiles is becoming greater each year, and the saturation point of automobile ownership is not yet in sight.

Millions of dollars have been spent by Pittsburgh in the last few years for the widening of old streets and the opening of new streets, and in years just ahead additional millions will without doubt be needed for the same purposes. However, there is a limit beyond which it is not physically or economically possible to go in the changing of the old established street system of a city.

The mass of the population in Pittsburgh, the report says, is transported in street cars, which travel in the same streets as the free-moving vehicular traffic. These free-moving vehicles far outnumber the street cars, but they transport a much smaller part of the population than do the latter. On the other hand, the street cars cause an impediment to traffic that is greater in proportion than the space they occupy, and the mass of automobiles in the street cuts down the efficiency of the street cars to an extent that is scarcely realized.

RAILWAYS NEARLY KEEP PACE WITH INCREASED TRAFFIC

The increase in traffic in the "triangle" during the last ten years is adequately shown in the report by the accompanying diagram. It is based on four counts as stated on the graph and shows an increase of about 127 per cent in ten years. This rate of increase is almost ten times that estimated for the population of the state of Pennsylvania for the same period. In spite of this great increase in the flow of vehicular traffic into the triangle, only a small minority of all persons entering the triangle come by automobile. The street car system is still by far the most important means for transporting the people in the conduct of their daily affairs.

This is indicated by traffic counts made by the Bureau of Traffic on April 14, and by the Transit Commission in 1917 of all persons entering the triangle between 8 a.m. and 6 p.m. These figures, expressed in percentages, follow:

			Per Cent o	f Total
			1917	1928
Entering	by	street car	58.2	51.2
Entering	by	automobiles and taxis	14.9	21.6
Entering	by	railroad trains	7.8	11.8
Entering	by	motor buses	0.0	0.8
Entering	by	walking	19.1	14.8

If only the groups of persons who enter by street car and by automobile or taxi are considered, the respective percentages shown by these counts are as follows:

		Per Cent of	Total
		1917	1928
Entering by	street cars	79.6	70.3
Entering by	automobiles or taxis	20.4	29.7

These counts show that a greater proportion of per-

sons enters the triangle by automobile now than formerly. But they also show that the group entering by street car is still by far the most important group in the number, since it still comprises 51 per cent of all persons entering in any way, and more than 70 per cent of all persons entering either by street car or automobile.

The report then declares that these figures lead to the conclusion that it is the users of public utilities for mass transportation—the street cars—rather than the automobile users, who should be given the greatest consideration.

The conclusion reached by the commission as a result of this study is that with the increasing population and increasing business activity in Pittsburgh, the conditions will grow worse rather than better, and that the only logical method of increasing the capacity of the streets is to gain this capacity by vertical expansion. In other words, in the streets of greatest congestion, the street railways should be underground. The improved transit conditions thereby obtained will indirectly reduce the automobile congestion overhead because more passengers will travel on the cars.

Public Approves Interstate's New Interurban Cars

HERALDED by full-page advertising spreads in the local press and inspected by citizens of Jeffersonville, Ind., six new one-man, two-man, double-end interurban cars ordered last April by the Interstate Public Service Company of Indianapolis, Ind., were inducted into service connecting Jeffersonville, Ind., Louisville, Ky., and New Albany, Ind., last fall. The new units were enthusiastically greeted by both press and public

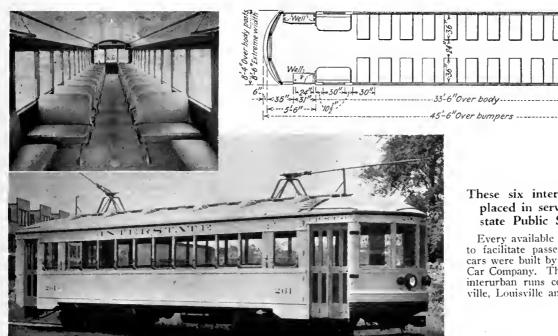
On the preceding day one of the cars was exhibited in Jeffersonville from 10 a.m. to 8:30 p.m., with Mayor Newton A. Green, acting as chairman of the reception committee. W. J. Fox, master mechanic of the company, was on hand to explain the car features to the visitors. Invitation to attend the exhibition met with the hearty response on the part of residents, who rejoiced that



Facsimile of full-page newspaper advertising employed by the Interstate Public Service Company to introduce its new cars

by means of the new cars quick access can be gained to Louisville and other large shopping centers without either crossing the river by ferry or driving by private vehicles, in the latter case with the attendant worry of finding parking space at the end of the journey.

Each car has a seating capacity of 52 passengers.



These six interurban cars were placed in service by the Interstate Public Service Company

Every available space has been used to facilitate passenger comfort. The cars were built by the G. C. Kuhlman Car Company. They are used on light interurban runs connecting Jeffersonville, Louisville and New Albany.

Type of unitOne-man, two-man, motor, passenger, interurban, double-end, double truck
Builder of car bodyG. C. Kuhlman Car Co. Date of order
Weights:
Car body
Trucks10,000 lb.
Equipment
Total
Bolster centers
Length over all
Length over body posts
Truck wheelbase
Height, rail to trolley base
Window post spacing
BodySemi-steel
RoofArch
Doora End, folding

Air brakes	Weatingbouse variable load
Car signal system.	Faraday high-voltage and Westinghouse 8-T
Commission	
Compressors	
Conduit	Flexible
Control	
Couplers	Tomlinson, Form 110
Curtain fixtures	
Curtain material	Pantasote
Door mechanism	National Pneumatic Co.
Finish .	Pratt & Lambert enamel
Floor covering	Battleship linoleum
Gears and pinions	
Class	
Uand bucken	Brill
Trand brakes	terial
Heat-insulating ma	Constituted Con Heating Co
Heaters	. Consolidated Car Heating Co.
Headlights	Imperial, type WDF
Headlining	
Interior trim	

dadre cose del aller	Journal bearings. 3½x6, pialn Journal boxes. Brill Lamp fixtures. G.E. short-circuiting Motors. Four Westinghouse 510-E, inside hung Painting scheme. Orangs Roof material Canvae. Safety car devices. National Sandera. Nichols-Lintern Sash fixtures. Curtain Supply Co. Seats. Brill 201-A Seating material Genuine leather Seat apacing. 36 in. Steps. Three, one folding Step treads. Kass and Sikkar Trolley base. Ohio Brass, Form 4 Trolley Retrievers. Kautson No. 5 Trolley wbeels. More-Jones 6 in. Trucks. Brill 177-E-1x Ventilators. Brill Wheels. 28-in. rolled steel Special devices. Minier window wipers, Drew motor-
7	man's mirrors
_	

Comfort is assured by ample space between the seats. These are of the Brill reversible pattern, upholstered in genuine leather. Wide aisles, roomy vestibules and the latest systems of interior lighting and no-draft ventilation, battleship linoleum floor covering, 30-in. windows and a finish of mahogany are other features of the interior. An orange color scheme, standard for the company, is used effectively on the exterior.

Principal specifications of the car are shown in the accompanying table.

Brady Presentations Made

Three Memorial Medals Presented to Representatives of Winners at Ceremonies Held at Hotel Biltmore on Feb. 17

PRESENTATION of the three Anthony N. Brady Memorial Medals awarded by the American Museum of Safety for outstanding accident prevention and health promotion work among electric railways for the year ended Dec. 31, 1926, to the Louisville Railway, the El Paso Electric Company and the Tide Water Power Company and the certificate of honorable mention awarded to the Pittsburgh Railways was made to the executives of the four companies at ceremonies held in New York City at the Hotel Biltmore on Feb. 17.

Lewis Gawtry, president of the Bank for Savings, a trustee of the American Museum of Safety, and chairman of the museum's committee of award presided at the function, and the presentation of the medals and certificate was made by him. Other speakers were Arthur Williams, vice-president in charge of commercial relations of the New York Edison Company and president of the museum; and Col. A. B. Barber, manager transportation and communication department, United States Chamber of Commerce, and member of the committee of awards. Lucius S. Storrs, managing director of the American Electric Railway Association, and James H. McGraw, president of the McGraw-Hill Publishing Company, Inc., were unable to be present, Mr. Storrs having recently been sick and Mr. McGraw being absent from the city. J. P. Barnes, president of the Louisville Railway; C. W. Kellogg, president of the Engineers Public Service Company and vice-president of the El Paso Electric Company; Raymond Hunt, vice-president and general manager of the Tide Water Power Company, and William H. Boyce, commercial manager of the Pittsburgh Railways, were all present to accept the awards on behalf of their companies.

Gold, silver and bronze medals are awarded as first prizes in three classes of companies, those operating more than 5,000,000 vehicle-miles a year, those operating

1,000,000 to 5,000,000 and those operating less than 1,000,000. The details of the award were reviewed in the JOURNAL for Jan. 28, page 148, since which time the principal features of the safety practice of each company have been made the subject of articles in this paper.

The annual award of the Anthony N. Brady Memorial Medal was discontinued during the late World War. The three awards was resumed at the request of the American Electric Railway Association for the purpose of again concentrating upon the element of safety in electric railway transportation which had been so greatly



Winners of the Brady medals receiving their prizes on Feb. 17

stimulated during the period in which the medals were previously conferred. Mr. Williams said in part:

The museum has been impressed by the constructive attitude of the electric railway men of the country. On every hand there is evidence of an intense desire to conserve to the greatest attainable extent the interests of the traveling public and the communities they serve. In a period of relatively low fares and limited income, with necessary economies in many directions, their attitude has been that there should be no curtailment in the safety field. Perhaps no better illustration can be found than in the fact that during the past four years, with enormous increase relatively in the hazards of street transportation, the number of accidents on electric street railways, occurring from all causes combined, has been reduced 15 per cent. There has been only one fatality for each 155,000,000 passengers carried; and intelligent, organized safety effort promises still further improvement.

To those acquainted with the problems of electric railway operation these figures indicate an extraordinary degree of security. Here not only are the hazards inherent in the movement of street cars, often through the densest areas of population, but in addition there are the many uncontrollable hazards occasioned by drivers of horse vehicles and automobiles—and what is perhaps an even more serious problem, the attitude often of extreme carelessness, indifference and seeming willingness to assume unnecessary risks, by pedestraians of all ages. The aroused interest and organized movement in this field of safety effort must be credited in no small degree to the award of these medals in memory of that distinguished public utility pioneer and public servant, the late Anthony N. Brady.

Colonel Barber said in part:

On behalf of the Chamber of Commerce of the United States

I am glad to have the opportunity to join in doing honor to the leaders in the great industry of urban transportation who are showing the way to continued improvement in service to the public. Never has there been a more insistent demand for betterment of service in every branch of the public utility field. I think it can equally be said that never has the public as a whole been more appreciative of such improvement and more ready to recognize the necessity of adequate financial return to the utilities if they are to give the service desired.

The National Chamber is firmly convinced that in securing

this service the public can reap the greatest benefits through the initiative of modern business enterprise. The Chamber is accordingly gratified when the efforts of the managements and the men of our great transportation systems are stimulated and brought to public attention in such a well conceived contest as this which has been established in honor of Mr. Brady.

I should like to add a word on behalf of the National Conference on Street and Highway Safety, a co-operative undertaking of a number of national associations and other official and unofficial groups for improvement of motor traffic conditions. As director of the conference since its organization by Secretary Hoover in 1924 it gives me pleasure to testify to the splendid cooperation of the electric railway executives in the committee work, in the general conferences and in the work of following up and putting into effect the plans worked out by the conference for dealing with the traffic problem.

Charles Gordon, speaking for Mr. McGraw said:

In these days of increasing traffic congestion and hazards we have become so accustomed to the perils and the tragedies of traffic accidents that our minds accept a situation which a decade ago would have provoked instantaneous public horror and demand

for radical measures.

Safety has always been a big word with electric railways. Safety measures have constantly occupied the attention of their managements. The effort to avoid accidents permeates every department of an operating company and the accident hazard has always loomed large in the minds of those in charge of personnel and equipment. As street traffic hazards have increased with the growth of congestion, the pressure of accident prevent work has increased in intensity, until today we find electric railways establishing a record for the safety of their service which shines out as one of the brightest spots in local transportation history.

Today, a passenger on a street car is in the safest place on the street. Hundreds of millions of passengers per year are handled in the rush and bustle and impatience of city life, with an unsurpassed record of safety. This is indeed a record of which every

passed record of safety. This is indeed a record of which every electric railway man may be justly proud.

There is not time here to comment on the accomplishments of the winning properties. It is fitting to note, however, that these several roads succeeded in winning public co-operation and commendation for their safety work. Their attention to safety transcended the limits of merely their selfish interest in the reduction of accidents on their cars. They went outside their own operations and participated enthusiastically in general safety movements in their communities. The attention given to the promotion of safety work among children is particularly worthy of note. The safety message is being taken into the schools, so The safety message is being taken into the schools, so that the child by being taught the importance of exercising caution on the streets, may be better equipped to avoid the perils of traffic.

I am proud to have served upon this committee and feel that the cause in which the award is made, is indeed a noble one. The gratitude of the entire electric railway industry is due the family of the late Anthony N. Brady for making these awards possible. I sincerely hope that they will be continued and that they will enlist constantly increasing interest among electric railway operating companies. The thanks of the industry are also due the American Museum of Safety for the efficient manner in which the awards are being administered. My hearty congratulations are extended to the Louisville Railway, the El Paso Electric Company and the Tidewater Power Company for their success in

winning this distinguished honor.

New Type Street Cars in Holland

WENTY new motor-equipped cars and twenty trailers were purchased a short time ago by The Hague Tramways, The Hague, Holland. Several new features have been embodied with the object of enabling a higher average speed, reduced maintenance costs and reduced weight. These features include lower mounting step, quieter running, better ventilation and lighting,

larger windows, leather upholstered seats and more comfort for the passengers generally.

The motor-equipped cars carry 67 passengers and the trailers 71. However, seating accommodations are provided for only 23, fifteen passengers being allowed to stand in the center aisle of the cars and 29 on the front and rear platforms, with an extra four on the trailers owing to the extra space provided by the absence of the control levers.

Platforms are 25 in. from the ground and entrance is afforded by mounting steps on each side at front and rear and through double sliding doors. At each end and on each side are longitudinal seats for two passengers. The remaining passengers face forward, the back rests being reversible. There are five rows of two-passenger seats on one side and five single seats on the other. The domed roof of the vehicle is 9 ft. 11 in. from the ground. The pantograph for the reception of the current is adjustable for overhead conductors ranging in height above the roadway from 12 ft. 5 in. to 22 ft. 11 in.

All the vehicles are of the four-wheel type, fifteen of the motor-equipped cars having a wheelbase of 12 ft. 5 in. and five having 13 ft. 2 in. The length over buffers

is 35 ft. 3 in.

The electrical equipment of the motor cars comprises two Siemens-Schuckert self-ventilating motors, which with current at 550 volts have an hourly capacity of 43 kw. at 700 r.p.m. Controllers are provided at each end of the motor-equipped vehicles. The sliding doors are provided with a device by which they can be electrically opened and closed. Fully equipped, but without passengers, the motor-equipped cars weigh approximately 12 tons and the trailers about 8 tons. All the motor-equipped vehicles and ten of the trailers were built by Allan & Company of Rotterdam, and the remaining ten trailers by the Nicaise-Delcuve Company of Bruges, Belgium.

New High-Power Locomotives for France

TWO electric express locomotives for standard gage ■ lines, claimed to be the most powerful in Europe, were recently delivered to the Paris-Orleans Railway by Brown, Boveri & Company. They have been designed for express service between Paris and Vierzon and will deal with trains of 650 tons trailing weight.

These new locomotives are of the 2-D-2 type. Current is received from an overhead line and from a third rail at 1,500 volts, at which pressure a one-hour rating of 4,000 hp. is obtained at the tread of the wheels at a speed of about 73 km. per hour (45 m.p.h.). The total weight of each locomotive is 119 tons. The chief requirements were that the locomotives should attain a speed of about 130 km. per hour (80 m.p.h.) on suitable permanent way and also be able to traverse curves having a radius of 80 m. (260 ft.) at low speed. These conditions led to the use of a two-axle bogie, fitted with a spring centering device, on each locomotive.

Since these locomotives have been in operation it has been possible to shorten the time required for each journey. The journey between Paris and Les Aubrais formerly took from 92 to 100 minutes and that from Les Aubrais to Vierzon 74 to 76 minutes. Since electrification it is possible for trains of 530 tons to run over these sections in about 75 to 55 minutes respectively.



This single deck coach has supplanted the double decker for base service in Atlanta

Single-Deck Buses Give Base Service in Atlanta

HEN bus service was begun in Atlanta by the Georgia Power Company a little more than two years ago, double-deckers were purchased. It was believed that the upper deck would attract many passengers except during very inclement weather.

Double-deck coaches were operating exclusively during 1926, but the operating expenses were so large, it was decided either to substitute a smaller coach or discontinue the service. In consequence, ten single-deck coaches of 21-passenger capacity were purchased. During 1927 they were operated exclusively on the base schedules. The double-deckers helped to carry the rush hour crowds and were also in demand for chartered service by pienic parties, convention delegates and other large groups.

The operating expenses and revenue during 1926 and 1927 of the bus service in Atlanta are given in the accompanying table.

It will be noticed that while the revenue from operation is slightly less in 1927, the operating expenses show a reduction of \$49,268.53. Of this amount about \$14,100 can be attributed to the reduction in tire prices, brought

this saving in tire cost, there is a net saving in operating expenses of \$35,268.53. Part of this saving in operating expenses is due to certain economies which have been effected at the garage because of changes in methods and new equipment which has been installed. While the net amount saved in this way cannot be accurately determined, the officers of the company do not estimate it as a

SUMMARY OF OPERATIONS, ATLAM	TA COACH CO	MPANY
	1927	1926
Revenue from operation	\$108,162.84 124,946.63	\$109,868.75 174,233.16
Deficit from operation	\$16,783.79 528,086	\$64,364.41 504,418

very considerable factor but consider that most of the saving is directly attributable to the operation of the lighter equipment.

The reduction in revenue from operation is due very largely to a decrease in Sunday and holiday riding. When the coaches were first put on, Sundays and holidays were the busiest days. After the novelty wore off, this riding decreased, so that Sunday riding now is lighter than on week days in about the same proportion as on the street railways.

The accompanying engravings show exterior and interior of one of the single-deck buses, as built by the about by buying tires on a mileage basis. Allowing for Yellow Truck & Coach Manufacturing Company.





The 21-passenger coaches operated by the Georgia Power Company in base service are fitted with comfortable seats. and the interior is well lighted

Maintenance Methods and Devices

Magnet Valve Gage

By R. S. Beers,

Railway Engineering Department General Electric Company, Schenectady, N. Y.

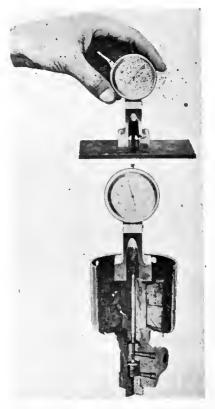
WHEN maintaining magnet valves it is desirable to measure the length of the valve stem when overhauling or at more frequent periods. An indicating device that will give measurements in thousandths of an inch can readily be constructed by making an adaptation of an indicating surface gage.

A gage for this work may be purchased from any hardware store. It should have an adjustable dial and a push pin at the top, the former for easy setting of the pointer at the zero position and the latter to check the travel of the valve movement. It will be necessary to make and add to the gage a support or pedestal, as shown at part A in the accompanying line cut. Part B is an extension piece to the gage push rod. The assembly of the gage and new parts is shown at C. Before making any measurements the gage should be adjusted by placing it on any flat surface and turning the adjustable dial until the zero position coincides with the pointer. The gage should then be set on the magnet valve core with the

push rod resting on top of the valve stem, as shown in the illustration. The gage then reads directly in thousandths of an inch the distance the top of the valve stem is above the top of the magnet valve core. The push pin is then pushed down and when the valve seats, its travel is read in thousandths of an inch.

These measurements are made quickly and accurately and show whether the valves need replacing or are suitable for further service. The gage has a further use when fitting new valves, as it will indicate quickly how much metal must be removed from the valve stem. The new valve stem is first put in the valve and then gaged.

Assuming that the gage shows that the new valve stem is 0.005 in. too long, the valve stem should be removed from the valve and put in the fixture shown in sketch D. The gage should then be set on the fixture with its push rod on the top of the valve stem. The valve stem should next be moved either up or down until the gage shows that the stem projects 0.005 in. above the flat surface of the fixture. The stem is then clamped in the fixture and the top of the valve stem filed off flush with the surface of the fixture. This is a quick



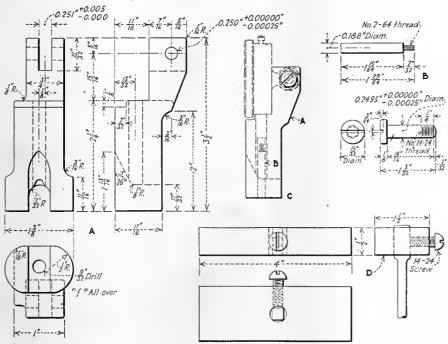
Micrometer gage for adjusting magnet valve. At top, adjusting gage dial to zero on flat surface; below, method of using gage on magnet valve

and accurate way of making the valve stem the exact length desired. Valve stems finished in this way present a flat surface for the magnet valve armature to strike against and prevent mushrooming of the top of the valve stem.

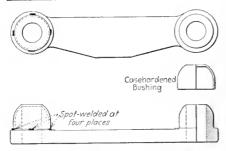
Bushing Provides Increased Service for Brake Hangers

By H. C. Pressler, Master Mechanic Eastern Texas Electric Company, Beaumont, Tex.

CASE-HARDENED bushings are used in the half-ball brake hanger shown in the illustration herewith. Each bushing is spot welded to the hanger and can be knocked out easily when worn so that a new one can be installed. Before these bushings were used on equipment of the Eastern Texas Electric Company worn hangers of this type were taken off Birney safety car trucks and thrown into a scrap pile. Now they are all reclaimed by filling in with the welder and then grinding off so



Dial gage on support. A—pedestal, B—extension for gage pushrod, C—assembly of gage and parts, D—fixture for valve stem setting



Half-ball break hanger with casehardened bushing

as to provide a proper fit for the The bushing is then inbushing. stalled and is spot welded in place. This method of reclamation costs about 30 cents for each hanger. When only a new bushing is required, the cost is 14 cents. There is quite a saving, as new hangers cost \$1.65 Brake-shoe heads are also equipped with these bushings and castings. Alemite fittings were installed on the shoe heads in 1926. With the installation of the bushings, together with the improved lubrication system, noise in brake rigging has been kept to a minimum.

Portable Adjustable Stand for Drill Press

RILLING has been simplified greatly in the Woodside shop of the New York & Queens County Railway, Long Island City, N. Y., since a portable adjustable stand was developed for supporting the material undergoing the drilling process.

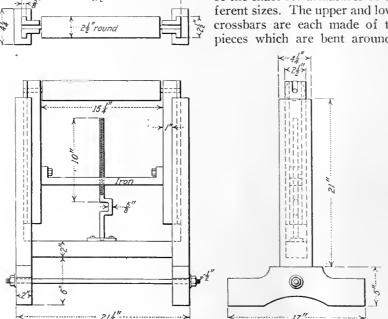
This stand, occupying a space of 17 in. by $21\frac{1}{2}$ in., is made from well

seasoned oak. It is 26 in. high in the fully collapsed position. 2-in. \times 4½-in. uprights are mortised into the 2-in. \times 5-in. \times 17-in. feet and tied together with a ½-in. bolt and a 2-in. x 4-in. beam at the base. Vertical notching of these uprights provides a guide for the up and down movement of the roller supporting framework. The top of the uprights of the movable framework is notched for a bearing support of the roller and the correct center of these uprights is maintained by an iron tie bar drilled in the center for the reception of an adjusting screw. An iron plate fastened to the top of the 2-in. x 4-in. cross beam acts as bottom guide for the $\frac{5}{8}$ -in. adjusting screw. Turning the adjusting screw permits of raising or lowering the roller to any height desired.

Adjustable Sling for Armatures

THERE the end method of dipping is in use some type of sling is necessary for handling the armature during the dipping process. The accompanying illustration shows the adjustable sling used in the shop of the Binghamton Railway, Binghamton, N. Y. It consists of a top and bottom crossbar and two side arms, all being made from ½-in. x 2-in. material. The lower ends of the side arms are bolted loosely to the bottom crossbar to form a hinge and the tops are drilled with eight pairs of \frac{1}{6}-in. holes spaced at 2-in. centers. allows the top crossbar to be ad-

> justed to support the upper end of the shaft for armatures of different sizes. The upper and lower crossbars are each made of two pieces which are bent around a



Stand for supporting and guiding material while being drilled



This sling will accommodate different length armatures

 $3\frac{3}{4}$ -in. mandrel and riveted and welded together. The $3\frac{3}{4}$ -in. holes provide an opening for the entrance of the shaft. The sling is 42 in. long over all, and 20 in. wide and is put on and adjusted when the armature is in a horizontal position. The weight of the armature is carried on the pinion end oil deflector.

Bus Cleaning Systematized With Shower Rack

WATER pipes on the regular framework of a wash rack are arranged ingeniously in one of the garages of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. As rapidly as the buses roll in from their daily schedule, they are run under the framework shown in the accompanying photograph and are subjected to a thorough soaking and cleansing, from which they emerge spick and span for the next day's trips.

Two rows of horizontal water pipes, one at a slightly higher level than the bus roofs and the other about level with the fender crowns, are perforated so that water is sprayed evenly and with some force against both sides of the bus at the same time. Water jets placed at the ends of the horizontal pipe lines contribute additional streams to clear both front and rear of the bus body of its ac-



Pipe frame spray rack speeds cleansing of Milwaukee's buses

cumulated dirt. Spraying the water on the bus body in fine streams makes it possible to soak the dust and dirt in short order.

Rigidly mounted lamp units are so placed on the framework of the wash rack as to illuminate every part of the bus to be cleaned. Two buses may be washed simultaneously in the double wash frame shown. The arrangement of the pipe frames is such, however, as to lend itself to the addition of an indefinite number of "wash booths."

New Equipment Available

Expansion Boring Bars and Cutters

EXPANSION boring bars and cutters in a new line are announced by the Larkin Packer Company, St. Louis, Mo. Simplicity of construction and ease of operation are features claimed. All unnecessary parts, such as wedge guides, gibs, etc., that tend to weaken a tool due



Triple-duty car wheel-boring bar

to the removal of excess metal from the tool body have been eliminated. The boring bar bodies are forged of chrome-nickel steel and heat treated. Cutters are of high-speed steel tempered to a uniform hardness.

· A micrometer adjusting screw piloted in a hardened and ground self-centering thrust bearing controls movement of the expansion wedge and assures quick, accurate adjustment. Cutters are fitted to slots of standard dimensions and are adjustable quickly to any size within range

of the bar without special grinding. Direct locking, with each cutter held rigidly in the cutter slot by a piloted eccentric locking screw, insures accuracy of bore. All parts are standardized, and cutters are interchangeable. When worn beyond the expanding limits, they may be used in smaller bars of the same slot dimensions, and they are also adaptable in adjusting tools of other makes.

For boring out car wheels to fit axles, a Larkin triple-duty bar is designed with double arrangement of cutters so spaced as to permit roughing cutters to pass before finishing cutters engage, the single cutter chamfering the wheel following the finished cut, all in one continuous feed.

For older mills, where the spindle travel is insufficient to accommodate the wheel-boring bar, another type with distance shortened between the roughing and finishing cutters is supplied. This is designed to rough bore and chamfer on the first cut and finish bore separately on the second cut. For shops in which only a limited number of wheels are bored, a bar with a single arrangement of expanding cutters is recommended.

Portable Tinning Pot

SMALL tinning and soldering operations can be done conveniently by a late addition to the line of electric heating equipment made by the General Electric Company, Schenectady, N. Y. This portable tinning pot bears the designation RP, Form C. The device is built on the same principle as the larger General Electric melting pots. The heating unit is of the cartridge type and dissipates 150 watts. It is placed in a boss cast on the bottom of the crucible and is readily removable. The crucible and



Melting pot for dipping small parts

base are made of cast iron and the jacket is made of sheet steel. The connecting leads are heavy Deltabeston heater cord and the plug is of the armored type.

The pot is designed particularly for solder and tin having a maximum operating temperature of 500 deg. F. About fifteen minutes is necessary to reduce the full contents of the pot to working temperature.

While the pot is designed normally for 110 volt circuits, it can be supplied for use on 100, 120 and 240-volt circuits, if desired. It has an approximate shipping weight of 6 lb. The dimensions are $2\frac{1}{4}$ in. diameter, 1 in. deep inside, 5 in. diameter and $4\frac{1}{2}$ in. deep outside.

Thin Wrench for Small Spaces

NUTS that are hard to get can be turned with a wrench designed especially for that purpose, which is manufactured by the Billings Spencer Company, Hartford, Conn., and is marketed under the trade name "Klose-Kwarter Wrench." It is double headed, with the openings at a 75 deg. angle. Jaws are narrow and pointed and the heads are very thin. Both heads are on the same side of the wrench; this affords a comfortable grip and leverage.

The new wrenches are made in sizes to fit standard nuts. They are drop forged from chrome-molybdenum steel, which is exceedingly tough.

Association Activities

New Englanders Face Industry Problems

Vital importance of merchandising transportation set forth at Providence meeting. Bus maintenance paper presented

REBUILDING of street railway tions, must study this problem, work traffic through vigorous merchanon it morning, noon and night, eat, dising methods was the keynote of the Feb. 9 meeting of the New England Street Railway Club held at the Hotel Biltmore, Providence, R. I. The program was arranged by A. E. Potter, president of the United Electric Railways. Vice-President W. C. Slade occupied the chair in the absence of R. B. Stearns, president of the club. Two sessions were held as usual, with a banquet between them. The speakers at the afternoon session were: W. C. Bell, general manager Narragansett Electric Company, Providence, whose subject was "Outside Observations of the Street Railway Business"; W. B. Spencer, assistant to the general manager, United Electric Railways, who talked on "Serving a Nation— Forward Ho' for the Trolleys"; and H. W. Jardine, supervisor of bus equipment, United Electric Railways, on "The Necessity for Closer Continuous Continuous Automatical Continuous Continuous Automatical Continuous C ordination of Service Automotive Equipment and Bus Maintenance.'

At the evening meeting a joint session was held with A.E.R.A. company section No. 12, H. K. Bennett presiding. The speakers were Hon. James E. Dunne, mayor of Providence; John W. Colton of the American Electric Railway Association, on "The Present and Future of Street Railways," and John F. Tinsley, vice-president and general manager Crompton & Knowles Loom Works, Worcester, Mass., on "The Future of New England."

Mr. Bell, speaking from the stand-point of an outsider, pointed out the marked difference between the electric railway business and the light and power industry. One fundamental reason, he said, is that the electrical industry can be operated and is operated in such a manner that it suits the convenience of the user at all times, while the electric railway, to some extent at least, must force the user to suit himself to the service. With this handicap, if the railway is to hold its own or increase its business, the service must be sold to the public. The desire to ride must be created, and the objectionable feature of public transportation must be minimized.

Mr. Bell's observation is that the street railway business has not even started to do a selling job. The street railways must start on this sales job earnestly and with real determination, and not spasmodically as in the past. Somebody, perhaps several people, perhaps whole departments, in each company and in the industry organiza-

on it morning, noon and night, eat, sleep, dream it, and must have the sympathetic backing of the management if results are to be obtained anything like those accomplished by the industries behind the motor car, silk stockings, or cigarettes. A real sales policy, program and organization are essential.

REASONS FOR AUTOMOBILE USE

Fewer riders are being carried by the electric railways, according to Mr. Spencer. He believes that this reduction in business will stop, but feels that additional riders must be obtained from the ranks of those now using private automobiles. The reason for the use of the automobile by these potential riders, he said, is probably because it is not necessary to wait on the corner, the rider is assured of a comfortable seat, a private unit, with continuous motion until the destination is reached. Perhaps the railways need a smaller unit operating more frequently. On the other hand, Mr. Spencer believes there is no substitute for mass transportation service. Automotive vehicles could not meet the test, due to lack of sufficient unit carrying capacity and the utter lack of sufficient street capacity. To get back the business Mr. Spencer advocates a national advertising campaign through newspapers, magazines of the greatest circulation, billboards and radio.

Commenting on the foregoing papers, vice-president Slade said that he was forcibly struck with the statement of a speaker that he would rather ride in the oldest "relic" the company has on the streets than to wait five minutes for one of the most modern type trolley cars with linoleum floor, plush seats, wide glass windows and ultra-modern lighting. This means that the availability of the service is the all-important thing. Speed is another very important factor in patronage. Mr. Slade said that the average street railway will have to use buses more extensively if it is to render the type of service above described.

A motion picture "East Side, West Side," drawing a comparison between the convenience, speed and comfort of street car and automobile travel in city service, was shown. John W. Colton spoke of the organized efforts the companies in Chicago, Pittsburgh and elsewhere have been making in the past decade to "sell" transportation. The film above mentioned, slightly modified, is now available through the

American Electric Railway Association. Charles C. Pierce, General Electric Company, Boston, commented upon the importance of developing the industry commercially and stated that plans are afoot to recapture lost traffic on the Boston, Worcester & New York Street Railway by placing open type cars in

CO-ORDINATED MAINTENANCE OF AUTOMOTIVE EQUIPMENT

Mr. Jardine pointed out that on most street railways all automobile equipment, buses and service vehicles alike, should be maintained in one group as motor-vehicles. Some roads operate nearly as many service vehicles as buses. From appearances, many oper-ators are not giving as much attention to service equipment as they should. Apparently, street railways now operating buses are passing through a period of transition in maintenance practices similar to that through which the large motor-vehicle companies went several years ago. Many of the latter had no periodic lubrication and inspection, overhaul programs of any kind, and paid dearly for their neglect in poor returns and costly maintenance.

On one property, he said, fifteen years ago the usual method of rebuilding was to pull the truck out of service, dismantle it and reconstruct from the ground up. This was satisfactory as the fleets were made up of so many types, makes and capacities that the cost of stand-by units was prohibitive. Its weak point was the great number of service hours lost during overhaul. About 1916 many of the older motor vehicles had been retired and steps were taken to standardize fleets. It was found feasible to start a unit overhaul program, because experience had shown that a complete overhaul of a vehicle failed to obtain the necessary results either in satisfactory operation or sufficiently low maintenance costs.

It was found that some units were capable of continuous operation for longer periods than others, and that a great deal of time and labor could be saved if complete assemblies were changed as units. It was therefore necessary to establish a simple system of mileage records and an identification system of unit numbers for all parts of the vehicle except the body and frame. Under this system a sufficient number of spare parts were held in readiness, so that, for example, when the engine on a truck had reached the point of overhauling, determined by the number of miles it had been continuously operated, a spare engine could be quickly substituted with minimum loss of service time to the truck. Not only was the loss of time to trucks cut down, but a considerable saving in the machine shop followed. A number of street railways operating motor buses, including the United Electric Railways, as well as some motor vehicle transportation companies have adopted this system of unit overhaul.

There are many reasons why automotive service equipment should be maintained at a high standard. The operation of service vehicles is generally tied up with a large number of workmen, and the failure or poor performance of a service vehicle frequently represents a considerable loss of labor. Such vehicles are generally identified with emergency repair work, and failure not only represents a loss of time but may contribute to the length of time that the basic schedules are interrupted. These losses of course do not appear in the vehicle maintenance costs.

THE FUTURE OF THE ELECTRIC RAILWAY INDUSTRY

Mr. Colton pointed out that about 41,668 miles of track are now being operated by the street railways of this country, a decrease of 7.2 per cent from the maximum of 44,835 miles in 1917. Over 18,000 miles of bus routes are in service, all established since 1921. There are about 75,000 electric street cars in operation and 9,000 motor buses run by traction companies. Last year the operating revenues of the industry were 2.5 per cent below 1926; expenses were 1.8 per cent less and net revenue 4 per cent less. The operating ratio increased to 75.2 per cent last year as against 74.6 per cent in 1926. Rail traffic was 3.25 per cent below 1926, and combined rail and bus traffic was 1.25 per cent lower.

The Metropolitan cities of New York, Chicago, Philadelphia and Boston show traffic increases of one-fourth of 1 per cent, but elsewhere losses average slightly over 2 per cent. In the small cities, those of 30,000 population or under, it is estimated that traffic has decreased 25 per cent since 1923. The interurban roads, most of which operate in comparatively thinly settled sections of the Middle West have lost about 22 per cent. In medium sized cities losses range from 1 to 7 per cent. Only a few have shown increases.

If these losses of traffic had been confined to the last year or two we should have little concern about them, but actually there has been a continuing traffic decrease for some years.

While figures like these sound depressing, we need to have them in order to face the facts. Mr. Colton declared that he believed the worst is over and that from now on traffic will show gains. The chief cause of lost traffic is private automobile competition. Before the automobile became cheap the traction industry gained an average of 5 per cent yearly in traffic. As the number of motor cars grew troubles began, until finally there were some who proclaimed the end of the industry. Motor bus manufacturers were notable among these prophets of

doom; experience has shown that they were wrong, and in recent years electric railways have actually been their best customers.

best customers.

"My belief," said Mr. Colton, "that we have about reached rock bottom in traffic losses is based on two facts, (1) the automobile industry seems to be approaching the saturation point in the distribution of private vehicles; (2) the productive power of industry seems to have become greater than the consuming power of the public, with the result that industrial conditions are somewhat unsettled."

COMING MEETINGS OF

Electric Railway and Allied Associations

March 2—Metropolitan Section, American Electric Railway Association, Engineering Societies Building, New York, N. Y.

March 13-15—Oklahoma Utilities Association, annual convention, Tulsa, Okla.

March 14-15 — Illinois Electric Railway Association, Springfield, Ill. March 21-22 — Central Electric Traffic Association, Seelbach Hotel, Louisville, Ky.

March 23—Maryland Utilities Association, annual meeting, Emerson Hotel, Baltimore, Md.

March 30—Executive Committee American Electric Railway Association, 292 Madison Avenue, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City. Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27 — American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22 — American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Publio Utilities Advertising Association and International Advertising Exposition, Detroit, Mich. July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

No matter how convenient the motor car may be to the individual it is undeniable that the presence on city streets of many thousands of automobiles tremendously increases the life hazard and materially affects the volume of business done by the merchants. It also places a heavy financial burden upon the taxpayer. Not long ago merchants in cities like Providence and Boston thought that the presence of a line of shiny cars in front of their doors advertised their popularity. Lately they have been finding that this does nothing but block the entrances to their place of business. Therefore, there is an increasing demand from merchants and other business men for the abolition of parking. Where parking has been forbidden in business districts, as in Pittsburgh and Chicago, it has been found that all kinds of traffic move more rapidly and that it is easier for the public to reach the stores.

It will not do for electric railway men to sit back and wait for business to come to them. The demands of the public today are vastly different from those of a few years ago. There is no panacea to be applied equally in all communities. It is quite possible many companies will have to abandon rail lines operating through the so-called high-class residential district and substitute for them a modern system of motor bus transportation.

Above everything else public transportation must be attractive, and having been made attractive it must be actively sold. After all the transportation business is nothing more than a merchandising proposition. Only by active, persistent, continuous promotion of the advantages of street railway service will it be possible to attract to the cars those who now prefer to ride in their own private vehicles, even though they know that the cost of using the private vehicle is much greater than that of using the street car or public service motor bus, and are fully aware of the inconveniences of driving through congested traffic.

Utilities Advertising Association Studies Stockholder Contact

A SPECIAL committee designated as a committee on contact with stockholders has been appointed by Donald M. Mackie of Hodenpyl, Hardy & Company, president of the Public Utilities Advertising Association, to study the practices employed by public utilities with respect to contact with stockholders. William H. Hodge, vice-president Byllesby Engineering & Management Corporation, has accepted the chairmanship and is working out a plan of activity.

Among the objectives of the committee will be a study of the policies observed by different utilities throughout the country in the matter of establishing contact with stockholders and the practices followed in keeping stockholders informed not only as to earn-

ings in customary channels but also as to what is being done to inform them as to the company's plans, its developments and its activities in the public service. From present indications, practices followed by different utilities are widely divergent in their aims and operations. There is a great diversity of opinion as to the manner and extent of disseminating information. This is the first study of this nature undertaken in the industry since the customer-ownership movement attained its present proportions.

The committee, in addition to Chair-

man Hodge, includes:

A. C. Watt, Hodenpyl, Hardy & Company, Inc., New York; Paul Jenkins, Utility Securities Company, Chicago; R. E. Smith, Southern California Edison Company, Los Angeles; Robert Montgomery, Louisville Gas & Electric Company, and C. E. Neil, North American Company, New York.

Special Transportation Arrangements for Rome Convention

SPECIAL arrangements have been made for transportation to and from the Rome convention of the Union Internationale de Tramways, de Chemins de fer d'Interet local et de Transports Publics Automobiles. The sessions will be held May 6 to May 13 inclusive, but during the convention a trip will be made to Naples, and after the convention one to Turin and Milan to inspect the electric railway systems there. In an announcement made on Jan. 25 it is explained that Premier Mussolini of Italy has agreed to act as honorary president of the congress.

The transportation arrangements for those who expect to attend from this country have been made with the Navigazione Generale Italiana line, whose headquarters are at 1 State Street, New York. The registration fees at the convention will be 100 lire (about \$5.30) for gentlemen and 50 lire

(about \$2.65) for ladies.

Work of Special Libraries Association Told in Year Book

PURPOSES of the Special Libraries Association, and the advantages of membership in the organization, are set forth in a year book recently issued. It was sponsored by the membership committee, of which Lewis A. Armistead of the Boston Elevated Railway is chairman.

There are at present about 1,200 members and subscribers in the United States, and four specialized groups have been formed within the national associa-These are the Commercial-Technical, Financial, Insurance and

Newspaper groups. Included in the membership are several of the larger electric railways and holding companies. Largely through their co-operation the bibliography on transportation has been enlarged so that many subjects in the field may be studied with much less effort than formerly. Those who visited the exhibit of the association at the last Cleveland convention were impressed with the value of the work which has been done along these lines, according to the year book.

Central Traffic Association of Growing Importance

WORK of the Central Traffic Association was reviewed in the annual report of the chairman, presented at the recent Cincinnati meeting. As each year brings additional legislation, states the report, further rulings from the Interstate Commerce Commission and state commissions and a broadening in the scope of the activities of association lines, so the past year has been the most active in the Tariff history of the association. publications are more numerous and more comprehensive to meet changes made effective in steam road tariffs applying on competitive traffic, or to enable electric roads to extend their operations to points on steam line connections. Changes in freight equipment and the purchase of new equipment have necessitated the reissue of the Equipment Register. Twentysix changes in the classification of commodities have made necessary reissue of the Joint Exception Tariff and the issue of one supplement. The Joint Class Rate Tariff, first published on Jan. 1, 1926, has been revised and is now ready for reprinting. Two new freight tariff publications have been completed during the year, one a Pre-pay Class Rate Tariff and the other the Joint Dispatch Freight Tariff.

During the year five regular and two special meetings were held, the average attendance being 33 members. Twentyeight committee meetings have been held and 147 subjects have been considered by the association. Among the valuable things done by the association have been changes in the rules governing settlement of freight claims, transportation of freight by truck, revision of the official interurban map, and an institutional advertising compaign. The past year has witnessed the consummation of through joint class rates to territory south of the Ohio River. This will greatly extend the territory for which shipments can be accepted by

the electric lines.
"The success achieved by the Traffic Association," concludes the report, "is due to a very great extent to the splendid co-operation of each individual member and the untiring efforts of the association committees. Delays in the performance of certain work have occurred, and certain work has been authorized by the association which has not been completed as the man power available has not been sufficient to carry out all these plans, but these matters are being worked out with the idea in view of affording the greatest possible benefit to the association members."

Central Accountants' Association Elects Officers

ORTY members from Indiana, Ohio, Kentucky, Pennsylvania and Michigan attended the convention of the Central Electric Railway Accountants' Association held at the Hotel Gibson, Cincinnati, on Feb. 17-18. Interchange rules applying to the accounting systems used by various railways, both steam and electric, in handling freight records, were the center of discussion.

The following officers were elected

for the ensuing year:
President, F. A. Healy, auditor and treasurer Indiana, Columbus & Eastern Traction Company, Springfield, Ohio.

First vice-president, H. F. McColgin. auditor Interstate Public Service Com-

pany, Indianapolis, Ind.

Second vice-president, C. E. Baker, auditor Lima Toledo Railroad, Lima, Ohio.

Secretary, L. E. Earlywine, Indianapolis, Ind.

Executive committee — Terms expiring in 1929: J. B. Hooper, Detroit, Mich., and L. J. Wetzler, Chicago, Ill. Terms expiring in 1928: O. A. Small, South Bend, Ind., and A. E. Wafer,

Akron, Ohio.

In his inaugural address President Healy traced the history of the association and its influence in the national association. Coming into the electric railway field in 1906 from the steam railroad field, Mr. Healy was instrumental in forming this association. which was organized in the spring of 1907. At that time, he said, electric railway accounting was in its infancy. There was no uniform classification of accounts and no standards to go by. Fortunately most of the auditors at that time came from the steam railways or at least had training in that school, so that after forming the association it was not difficult to harmonize the views of the auditors of the various railways and finally bring about a uniform system of accounting.

Mr. Healy pointed out that a number of the leaders in the American Electric Railway Accountants' Association have been actively connected with the Central Association, six presidents out of fifteen having been members. He said the electric railway accountants are still young in their experience compared with the steam railroad accountants. To succeed in the future it is necessary to keep abreast of the times, to study new methods and to co-operate one

with the other. It was decided to hold the next meet-

ing of the association in Detroit, on July 27-28.

British Tramways Association Meeting

ANNOUNCEMENT has just been made that the annual conference of the Municipal Tramways and Transport Association of Great Britain will be held in Manchester, England, on Sept. 12, 13 and 14, this year.

News of the Industry

No Rehearing in Baltimore

The United Railways & Electric Company, Baltimore, Md., has decided for the present not to ask the Public Service Commission for a rehearing in either the fare case or the easements case, both of which were decided a short time ago.

Just before the fare order was handed down the Public Service Commission placed a valuation of \$5,000,000 on the company's easements, a reduction of \$2,000,000 from the figure first set. The \$7,000,000 valuation case was appealed to the courts and the Maryland Court of Appeals ruled that it was proper to value the easements but held that the commission had not done so in the proper manner. Another hearing was held and the \$5,000,000 figure placed on the easements.

A few days after this case the commission handed down an order and opinion granting the company a fare increase from $7\frac{1}{2}$ cents or two tokens for 15 cents to 9 cents or three tokens for 25 cents. This decision and order were dealt with at length in Electric Railway Journal of Feb. 18. Under the Maryland Public Service Commission law the United had either to accept the ruling or file notice that it would not accept it within ten days.

In a statement sent to the commission by Charles D. Emmons, president of the United, and also signed by counsel for the company, it was said that both cases were so fully presented before the commission that the company felt that no good could be accomplished through rehearings. The statement mentioned, however, that that action did not affect the company's rights to ask for a judicial review of the findings by an appeal to the courts, which rights were fully reserved.

The company has 60 days from the date the decision was handed down in which to appeal to the courts. Officials of the United will make a close study of the effect of the increased fare before deciding upon an appeal. The original petition asked the commission for an increase to a 10-cent straight fare.

Traction Legislation Continues in Chicago

Deliberations of the Chicago City Council traction sub-committee in the drafting of acceptable legislation for the solution of the local transportation problem again have reached a point of almost hopeless confusion. Three terminable permit bills are now being considered by the sub-committee as a result of nearly eight months of intermittent work and negotiation.

One bill presented recently by Alder-

man Jacob M. Arvey seeks to give unlimited power to the city to grant a franchise without limitation of time. A second drafted by the corporation counsel is also without time limitation but stipulates that the penalty for violation of the terms of the grant shall be either purchase by the city or by a private company designated by the city. The third bill is the one which received the approval of the railway companies' attorneys. This measure does not provide for amortization of the properties or for punishment of the company for any violation of the franchise within a vear after the violation has been committed, although it does state that the permit may be revoked by purchase by the city or by another company designated by the city.

Some of the members of the committee are now favoring a 40-year term franchise under which the companies have admitted they could properly finance a consolidated transit system.

The amended consolidation bill which was expected to be passed in the aldermanic session following the companies' approval of it—like the terminable permit bills—is now being submitted to further study by the committee. This bill differs from the city's earlier draft in that it allows for the acquisition of the existing surface and elevated lines by an entirely new corporation or holding company.

Court Acts on Interborough Labor Issue

Justice Wasservogel decides contract between men of New York Company and management is unfair—President Hedley promises review of findings

THE Interborough Rapid Transit Company, New York, lost its injunction suit on Feb. 15 to restrain the American Federation of Labor and the Amalgamated Association from organizing the subway and elevated men. Supreme Court Justice Wasservogel decided that the contract between the Interborough and its men was unfair and that a court of equity would not protect it.

Justice Wasservogel also denied the Interborough's application to punish James H. Coleman, general organizer of the Amalgamated, for contempt of court for violating the injunction granted a year ago in the previous litigation to prevent unionization of the subway and elevated men. The court ruled that because the Court of Appeals had vacated the injunction before the contempt plea was made, on the ground that "its broad scope was beyond the power of the court," the restraining order was then a nullity. Decisions both of the Court of Appeals and of Chief Justice Marshall of the United States Supreme Court were quoted in support of this ruling.

In refusing the new injunction against the American Federation of Labor and the Amalgamated, Justice Wasservogel relied to a great extent on the Court of Appeals' holding in the Lavin case, brushing aside the contract signed last summer by the members of the Interborough company union, the brotherhood of the Interborough Rapid Transit Company, under which the members ceased to become mere employees "at will," but were signed up by the company for a two-year period.

In discussing the contract Justice Wasservogel said:

While plaintiff claims that the present contract involves mutual rights and obligations and was therefore made upon ample consideration, it is the contention of defendants that it is without consideration and because of the conditions to which it. was made subject, should fail in equity. Defendants call attention to the fact that the separate ratifying instrument is signed by the employees and does not contain any promise by the company to employ the men for any period of time; that it was not executed by the company, and any promise of the company to employ the men for a period of two years must come through the general committee of the brotherhood which, by the terms of the constitution of the brotherhood had the power to bind the men. Assuming, however, that the promise contained in clause 1 of the contract between the company and the brotherhood with respect to an employment of two years was actually made by the company to the men, it seems to me that such promise is practically made valueless to the employees by clauses 5 and 6 of this contract.

Justice Wasservogel said in part:

The contract purports to bind the employee for two years, while the employer is not in substance subject to a reciprocal obligation. Where an employee abandons all right to leave the service of his employer, whereas the employer reserves practically entire freedom to discharge him, there is no compensating consideration.

Whatever the status of the contract at law, the provisions above referred to are, to say the least, inequitable. The term of the contract is, in effect, controlled by the will of the employer and plaintiff is therefore in no better position than it was in the Lavin case. Not only the employees but also the third parties made defendants in this case may, in a court of equity, avail themselves of the defense interposed.

The allegations of the Interborough were that the defendants had organized Division 977 of the Amalgamated for the purpose of bringing into it the subway and elevated employees and thus to "destroy" the Interborough Brotherhood, and that plaintiff's employees were being induced to "secretly violate their contracts of employment and become members of the Amalgamated while ostensibly remaining faithful to their obligations as members of the brotherhood."

The defendants denied these allegations and set up the defense that "the two-year contract is void and unenforcible by reason of alleged fraud, deception, duress and overreaching conduct on the part of the plaintiff."

James L. Quackenbush, counsel for the Interborough, announced Feb. 15 that the company would appeal.

Frank Hedley, president and general manager of the railway, said:

The law department of this company will take steps to obtain a review of the recent decision denying an injunction to restrain interference to procure members of the brotherhood to break their agreements. In the meantime every member of the brotherhood is assured that it is the intention of the management to live up to the agreement in every way.

ment in every way.

The agreement between the brotherhood and the company is plain that no Amalgamated members can remain in the employ of the company. That agreement will be carried out by the company so long as the existing contract lasts. It is not intended to permit a small group of misguided employees to dictate terms to an overwhelming majority of loyal employees.

Celebration in Oklahoma City

Oklahoma City's first street car was piloted through the streets of Oklahoma City by L. B. Poulson on Feb. 15, celebrating the 25th anniversary of the first trolley service in the city. The car was placarded in recognition of the event and attracted much attention. The first street car in charge of Poulson, clattered down Broadway on Feb. 15, 1903. The system at that time consisted of 5 cars and 5 miles of track. The Oklahoma Railway now has 140 miles of track 129 cars, including interurban and 34 buses.

Safety Results Improved in Providence

Total accidents on the lines of the United Electric Railways, Providence, R. I., in 1927 decreased 8.9 per cent from 1926 or 641. Collisions with autos decreased, during the same period, 14.8 per cent or 549, this latter in the face of an increase, in round figures, from 112,000 to 120,000 in automobile registrations. In the large proportion of major accidents the trend was downward as it has been since 1923. In 1927 the cars ran an average of 3,811 miles per accident each month, and the buses an average of 9,509 miles.

Although the company regrets the increase in fatal accidents and collisions between its cars, it is gratified that employees' accidents in 1927 decreased 11.9 per cent over 1926.

Fare Increase to Be Asked in Shreveport

Capt. H. B. Hearn, president of the Shreveport Railways, Shreveport, La., has announced that the board of directors has decided to appeal to the Louisana Public Service Commission for an increase in car fares. The present fare is 7 cents for adults and $3\frac{1}{2}$ cents for school children.

In a formal statement, Captain Hearn declares that the company's net earnings last year were \$69,634 "on a property investment, valued by eminent utilities engineers to be \$2,804,884 at a minimum." After deductions of \$51,037 for interest on borrowed money, the statement continues, the company had \$18,597 left for improvements or dividends. The statement follows in part:

We have made a sincere and honest effort to operate successfully on the 7-cent fare for adults, and 3½ cents for school children. At the end of the last year we found that we had net earnings of \$69,634 on a property investment, valued by eminent utilities enginees to be \$2,804,884 at a minimum. After a deduction of \$51,637 for interest on borrowed money, we had only \$18,597 left for improvements or dividends. In short, the return was only approximately 2½ per cent, whereas the recognized fair return is 8 per cent.

The revenues under the 7-cent fare make

The revenues under the 7-cent rare make it absolutely impossible for us to meet the demands for service required by this growing community. We believe that when the people of this community are fully acquainted with the facts of the case, they will agree that our petition for an increase in the rate of carfare is fully justified.

We must remember that the system of the Shreveport Railways of today has been evolved at heavy expense from a small, inferior transportation medium into a service utility extending over 35 miles of track. The equipment of the company is of the latest design. The maintenance of the property has always won the admiration of men familiar with transportation problems and attending costs.

Everything has been done by this com-

Everything has been done by this company to insure to the people good service. But conditions are such, under the present rate of fare, as to make it mandatory for us to seek relief in the form of an increase.

It will be impossible for us to continue to operate successfully, and on a high basis of efficiency, unless we are afforded such relief as the condition warrants.

We are now compiling complete statistics and records which will place the entire case before the commission, and we intend also to acquaint the public with these facts, that they may judge whether our petition is justified. We believe that the judgment of the fair-minded people will be that we are warranted in seeking this relief.

Co-operation in Omaha Means Improved Service

Extra railway service for the convenience of the workers in the south side packing plants of Omaha, Neb., is now provided daily at the hour of dismissal through the co-operation of the packers and the Omaha & Council Bluffs Street Railway. The special service was arranged at a conference with

C. A. Cushman of Swift & Company, and W. C. Baughman, representing the railway. As the packing plant employees did not end their day's work at a given hour each day Mr. Cushman asked if the company could not supply extra cars no matter what the closing hour. Under the arrangement now in force Mr. Cushman's office notifies the railway each day at the release hour of the workers.

In this connection the improvement of the south side service followed a suggestion from outside of the company.

And Lo! Richmond Led All the Rest

Advertisements carried by the Virginia Electric & Power Company, Richmond, Va., in the News Leader for the period of one month were awarded first place in a competition with advertisements of 32 large utilities under the management of Stone & Webster. At the close of each month the Stone & Webster managed companies forward copies of all advertising matter put out by them to the company's home offices in Boston, Mass. These are analyzed by the McJunkin Advertising Company, of Boston, and the ratings announced.

In a letter received from the Mc-Junkin Company on Feb. 14 the Virginia Electric & Power Company was notified that it carried the largest volume of advertisements of any one of the Stone & Webster companies and the advertisements were noted for their effective, terse language and their pleasing appearance.

Injunction Against Parking Refused

Attempts of dissatisfied business interests to obtain an injunction against enforcement of the no-parking ordinance, which is now in its second month's trial, on downtown streets of Chicago ended suddenly on Feb. 18 when Superior Court Judge Oscar Hebel granted a motion to dimiss the bill of complaint. In denying a temporary injunction against the ban on Feb. 11, Judge Hebel had allowed the petitioners one week in which to file an amended bill.

The reason given for the withdrawal of the complaint by Samuel Pancoe, a "Loop" stationer who had headed the small group opposed to the law, was that the task of assembling evidence would require too much time and entail excessive expense.

An alternate plan of carrying to the Supreme Court a test case of a person arrested for violating the ordinance is said to be under consideration by attorneys for the dissatisfied merchants. This procedure, it was pointed out by the attorneys, would be much less expensive than to test the legality and reasonableness of the ordinance in the superior court.

Inquiry by Trade Commission

Walsh resolution amended. Investigation will concern itself with interstate companies

THE Senate, by a vote of 46 to 31, on Feb. 15 sent the utilities investigation to the Federal Trade Commission, thereby defeating the proposal of Senator Walsh for a Senatorial inquiry. The vote was on the amendment to the Walsh resolution offered by Senator George. After that, the amended resolution was adopted without a record vote.

The resolution as passed, in addition to the provision calling for monthly reports to the Senate, also authorizes an inquiry into alleged political activities of corporations concerning the public ownership question and elections since 1923 for president, vice-president and members of the Senate. Another provision is that the commission shall ascertain whether any of the alleged practices referred to in the resolution constitute unfair methods, tend to restraint of trade or to create a monopoly or violate the anti-trust laws. Another provision is that the sessions shall be open to the public.

The report of the Senate interstate commerce committee on the Walsh resolution was debated in the Senate on Feb. 13, 14 and 15. Senator Walsh led the argument for adoption of his resolution. He said the committee's restriction upon the inquiry to interstate business and companies with interstate connections was satisfactory, as it was never intended that the proposed committee should inquire into plants of small communities. However, he opposed the restriction that public utilities' campaign contributions to be inquired into should be limited to the elections of President, Vice-President and members of the House and Senate.

Senator George, having offered an amendment that the inquiry be made by the Federal Trade Commission, was the principal backer of this proposal. The proposition of Senator George included a provision that the Federal Trade Commission should report to the Senate within each thirty days after the passage of the resolution, and, finally, on the completion of the investigation.

On Feb. 13, Vice-President Dawes, as president of the Senate, explaining that he was financially interested in various public utilities, asked the Senate to amend the Walsh resolution so that appointment of the special investigating committee would be placed in other hands than his. Senator Walsh gave his assent to this, saying that he would ask that the special committee be elected by the Senate.

Five Lost on Key System Ferry

Official investigations into the Key System Transit Company ferryboat tragedy have ended and reports will be made next week. Five are believed to have been drowned when the ferryboat Peralta, loaded with commuters on the way back to Oakland from San

Francisco, suddenly plunged downward and shipped considerable water on Feb. 17. Twenty-one were washed overbroad from the forward deck, but 16 were rescued. Of the 5 lost, 3 were men and 2 women. No bodies have been recovered.

Government steamboat inspectors in an attempt to fix the blame, called many witnesses, including officials of the company and passengers.

New safety precautions have been instituted on the Yerba Buena, sister ship to the Peralta, in accordance with an order of John K. Bulger, supervising inspector of steamboats. Hereafter chains will keep passengers 40

feet from each end of the boat during trips and use of ballast, or trimming tanks will be discontinued. These rules will also apply to the Peralta when she returns to service. The tanks were blamed for the accident by many witnesses. It was claimed that the forward tank of the Peralta was filled with water when the accident occurred and that the weight of this water, plus the weight of the passengers who crowded forward as the craft neared the Oakland mole caused the Peralta to do a "nose dive."

Key officials denied that the tank was full. They declared that it had never been used for ballast purposes.

Fare Injunction Argued in New York

Counsel for city and the commission contends statutory court required—Counsel for company that federal jurisdiction be established

THE hearing on the temporary order granted by Federal Judge Winslow to the Interborough Rapid Transit Company, New York, restraining procedure under the State Supreme Court injunction was held on Tuesday before Federal Judge William J. Bondy. William L. Ransom, counsel for the Interborough, and Samuel Untermyer, for the city and the Transit Commission, argued as to whether the hearing should be before one federal judge or in a statutory court consisting of two federal judges and a judge of the Circuit Court of Appeals.

Mr. Untermyer raised the question of procedure to be followed. He contended that under congressional law a single federal judge could not hear and continue a temporary injunction which sought to displace state courts as having jurisdiction. He argued that the law required a statutory court of three federal judges to hear the motion. He said that "if these people are successful in holding up the city's action in state court, then the railroad 'has a royal road' on March 3 to a 7-cent fare."

GIST OF THE COMPANY'S PLEA

Judge Ransom stated the company's original complaint filed in Federal court established the Federal court's jurisdiction. He argued the original complaint was sufficient and not premature. The second proceeding by the company, that of getting a temporary injunction, he argued, was a separate move; that it relates only to and shows "acts by these defendants, subsequent to filing of the original bill in Federal court, which appears a deliberate plan amounting virtually to conspiracy, seeking to deny the company an orderly hearing before the court in seeking relief."

In later remarks he said the motion was simply to force the defendant to show cause why they should not be enjoined from prosecuting the actions which they began in the Supreme Court of New York County. According to Mr. Ransom it was simply a

question of the priority in time of the filing of the action. All the points of the State court suit are included in the action pending in the Federal court, he said, and declared that the real purpose of the defendants in getting into the Supreme Court was to gain some device by which they could restrain the Interborough from coming to the Federal court and getting protection from confiscatory proceedings. He said there was no question of the priority of the Federal court's suit, as it was filed at 9:20 a.m. Tuesday, Feb. 14, while the suits in the State court were not filed until after 12 o'clock. Under these circumstances Mr. Ransom said, the Federal court had no option but must assume full jurisdiction.

Mr. Untermyer said he asked the courts to decide that the city suits were begun first. He said the Transit Commission had taken two weeks to pass on the Interborough's application and that it did not act sooner because it was disturbed by the question whether it had a right to act under the city contract with the Interborough. court asked Mr. Untermyer whether there had been any cases in which the question of contracts has been raised in rate-making actions. There have been many of them, Mr. Untermyer answered, particularly the Columbus Railway case which was decided by the United States Supreme Court. In this case, the company was losing money, not even making operating expenses, while the I.R.T. is making money.

On Feb. 23 Mr. Ransom filed in the United States District Court a reply affidavit answering briefs filed on behalf of the city and the Transit Commission in their opposition to the suit now pending in the Federal court.

Mr. Ransom's affidavit is, generally, a repetition and summary of assertions made to him in the course of argument Tuesday before Federal Judge William Bondy. He lists five facts which he says neither the Corporation Counsel nor

the counsel for the Transit Commission has denied. The facts have been summarized as follows:

- 1. That the Interborough's suit was started in Federal court before the authorities filed in the State courts.
- 2. That the commission and the city started their actions for the purpose of preventing the Interborough from making an application for a special statutory court and from taking other steps in the Federal action.
- 3. That the schedules embodying the increased fare were duly filed with the Transit Commission by the company and are still on file.
- 4. That the 5-cent fare is "grossly in-adequate, and in fact confiscatory."
- 5. "That at least \$142,894,000 of present value of the elevated properties are being daily confiscated by the inadequate earnings under the 5-cent fare; that \$140,579,474 of property owned by the plaintiff and \$272,-940,174 of other property provided by the plaintiff is being confiscated by the 5-cent fare; and that not more than \$342,380,000 of the total of \$898,793,648 of the present value of rapid transit properties used in the plaintiff's business was provided by the city of New York."

The city and the Transit Commission secured a temporary injunction from Supreme Court Justice Edward J. Glennon on Feb. 14 restraining the Interborough from increasing its fares to 7 cents. Procedure under this injunction was stayed by a temporary restraining order issued to the company by Federal Judge Winslow on Feb. 17. The latter restraining order is effective for 10 days or until Feb. 27. The question for Judge Bondy to decide is whether he had jurisdiction in the matter and if so whether the restraining order should be continued. If the Federal Court's temporary restraining order is continued, then the company will probably ask for a temporary injunction permitting it to charge a 7-cent fare pending decision on its original application asking for a permanent injunction.

Hearing on Use of One-Man Cars in New York City

The operation of one-man cars by surface railways in New York City will come before the Transit Commission at a public hearing on Feb. 29, called on recommendation of the service bureau and the chief engineer. According to the report made to the commission by the service bureau, some of the companies have started or extended one-man car operation without due notice to the commission. At the present time 1,404 one-man surface cars are being operated in the city. The commission seeks to have all of these cars equipped with more safety devices, and to compel the railways to notify the commission before starting or extending one-man car operation on any of their lines so that the commission may approve any plans for changing equipment of cars for oneman operation or of the routes over which one-man cars are to operate.

More Moves to Speed Up Traffic in Detroit

At a meeting held with the Mayor, Common Council and interested department heads_on Jan. 24, the Commissioner of Public Safety at Detroit, Mich, suggested that a 30-day test be made on Woodward Avenue between the River and Fair Grounds during which time the street cars would make express stops between Adams Avenue and the Six Mile Road; local stops between the River and Adams Avenue and between the Six Mile Road and the Fair Grounds; and the buses would make local stops between the River and the Six Mile Road. It is believed that a combined service of this kind would materially expedite the flow of all types of vehicular traffic on any street where trolley cars are operated. In this connection it will be recalled that a combination express street car and local bus service was placed in service on East Jefferson Avenue under date of Sept. 18, 1927.

AVERAGE VEHICLE SPEEDS ON WOODWARD AVENUE AS DETERMINED FROM TESTS

3:30 to 6:30	7:30 to 10
P.M.	A.M.
Northbound	
Thursday.	Saturday.
Dec. 9, 1926	Dec. 18, 1976
M.P.H.	M.P.H.
5.8	7.0
	8.3
	7.0
	4.5
	12.0
	9.6
	12.9
	14.0
	17.0
	17.0
	14.5
10.2	17.5
13.0	15.5
15.0	15.5
12 2	15.2
	12.4
	P.M. Northbound Thursday, Dec. 9, 1926

G. C. Schink, inspector, director of traffic for the Detroit Police Department, on Jan. 26, in a bulletin on the general features of the traffic situation from the police department's traffic survey bureau report, said:

We believe that "rush hour" traffic (to

We believe that "rush hour" traffic (to the Loop District in the morning and outbound in the afternoon) should be given special prference by keeping open for moving vehicles the full width of pavement in the direction of the greatest traffic movement. This is provided for by the present ordinance but is not yet satisfactorily observed although, conditions are

served although conditions are improving. Slow moving vehicles obstruct traffic, diminish the number of vehicles that can pass a given point in a given time and increase the amount of passing of one vehicle by another, thus adding to confusion and danger. Certain vehicles, such as heavy trucks, which inherently must proceed at slow speed are required to travel close to the curb. This requirement is fairly well observed but fails to solve the problem of interference with free movement caused by the presence of othr slow moving vehicles.

Street cars using the natural highest speed lane and operating on a local stop service become slow speed vehicles and in view of the ordinance requiring other vehicles to stop with them, have a very definite retarding action on all other vehicular movements.

Various writers on traffic matters point

out that the maximum results in the flow of vehicles along a thoroughfare are obtained when vehicles move at a rate of speed between 15 and 25 m.p.h. On Woodward Avenue, for example, tests show that the average vehicular section speeds are considerably lower. This necessarily means that the most economical use of the roadway is not being attained. Other thoroughfares on which street car lines are located, show similar conditions.

Safety Bonus in Houston

The Houston Electric Company, Houston, Tex., has announced that beginning Feb. 1 all operators of cars and buses who are not charged with an accident during the month will receive a bonus of \$5. It is expected that the 460 men on the company's pay roll will receive about \$25,000 through this bonus. During 1927 accidents decreased 12½ per cent, compared with the number reported during 1926. Last year the number of miles covered by buses and street cars increased more than 8 per cent compared with the preceding year. Accidents for which operators are not responsible will not be charged against their records.

Transportation in Other Lands

A description of transportation in other lands is being published in the British Columbia Electric Employees' Magazine from a copyright illustrated travel talk by P. Bentley, Dominion Photo Company, Vancouver. Mr. Bentley has granted special permission to the Employees' Magazine to run these articles. The fourth of a series appeared in the February number. His talk on freight transportation in India was prepared by him while on board the R.M.S. "Empress of Canada" during a world tour.

Safety Posters in Indianapolis

A scries of safety posters will be placed on the cars of the Indianapolis Street Railway in Indianapolis, Ind., in an effort to curb automobile accidents this year. The cards will be replaced with different ones weekly.

Veterans Awarded Emblems in Atlanta

Nine 40-year men of the Georgia Power Company, Atlanta, Ga., were recently decorated with diamond buttons indicative of their loyalty and service. In ceremonies which marked the award of emblems, officials of the company paid high tribute to the faithful men. Beginning with exercises in December when 714 Atlanta employees, with ten or more years of continuous service were given their buttons, a total of 926 employees throughout the state were decorated during the course of the same week in similar exercises at various district headquarters.

Singing the Song of the Trolley in Grand Rapids

Having the praises of the railway, its rail coachès and its service sung by an entire city to the accompaniment of the leading orchestras is the new good will and publicity program launched by L. J. DeLamarter, vice-president and general manager of the Grand Rapids Railroad.

When the Grand Rapids company placed its new electric rail coaches in service it also launched a new slogan to go with them "Don't Worry! Relax! Ride the Street Cars. The Safest Place in Town."

Other local advertisers adopted the "Don't Worry! Relax!" part of the slogan to tie to their own publicity until the slogan practically became a household word.

One day recently, Mel Gilleland, director of the leading orchestra in the city, scribbled off a verse that he believed fitted in well with the slogan and showed it to Mr. DeLamarter. He revised his work and then the orchestra director set the words to music, a catchy and tuneful melody that offered opportunity for pleasing syncopation by orchestras:

RIDE THE TROLLEY CARS!

Don't worry! Don't hurry!
Relax; ride the trolley cars
The safest place in town.
Don't worry! don't hurry;
Ride and be merry.
Happy friends will meet you there.
Smile, and the world smiles with you,
Frown and you frown all alone.
So don't worry! Don't hurry!
Relax and ride the trolley cars,
The safest place in town.

Without previous announcement Mr. Gilleland sprang the song a few nights later at a large dance. It proved a "hit." There was a demand for encores. Other orchestras asked permission to use it and Mr. Gilleland cheerfully dedicated his song and music to Mr. De-Lamarter and the railway. Then it received city-wide and free distribution. Now it is being sung and played by the orchestras in dance halls, theaters and other public places, while in hundreds of homes small groups gather around the piano and sing the words.

Another Transit Plan Proposed for New York

Public ownership of all transit facilities in New York has been proposed by Comptroller Charles W. Berry in a report to the Board of Estimate.

He would have the city take over all subway, elevated, surface and bus lines, which eventually it would own outright. The city would control all finances and the operating company would be under municipal supervision.

A 5-cent fare would be compulsory for three years. At the end of that time, if a deficit were shown, the Board of Estimate would decide either to try the experiment for three years more or submit the fare increase to the voters.

Among the outstanding features of the plan are:

1. Absolute control by the city of New York of its transit facilities—subways, elevated, surface and bus lines—and all revenue derived therefrom above actual expenses of operation.

2. Ultimate ownership by the city of New York of all transit lines with the right to remove or replace any line at any time.

3. A 5-cent fare with adequate transfer for a unified interborough service embracing all subways, elevated, surface and bus lines which are rendering necessary service or may be needed for a comprehensive transit system.

4. Consolidation in one body of all commissions having supervision over transit activities with corresponding economy of administration, improvement in service and elimination of jurisdictional disputes.

5. Construction of necessary bridges or tunnels between the boroughs of the city.

Wage Increase in Baltimore

An increase of 1 cent an hour for all platform men and a 2 per cent increase for all salaried employees was announced recently by the United Railways & Electric Company, Baltimore. The increase dates from Feb. 13 when the new fare rate of 9 cents or three tokens for 25 cents went into effect. In this order \$260,000 was allowed for wage increases this year. Under an agreement the company had with its employees similar increases were granted the first of this year. Trainmen are now receiving 55 cents an hour.

Officials of the company and representatives of the employees held a con-

ference in 1926 and following this the company contracted to grant increases on Jan. 1, 1927; on Jan. 1, 1928, and a proportionate increase at any time a raise in fare was granted. Charles D. Emmons, president of the United, has pointed out that platform men were receiving 22 cents an hour in 1916. The two increases granted this year amount to about \$130,000 for platform men and about \$130,000 for salaried employees.

Alameda Lines to Be Restored

The Key System Transit Company, Oakland, Cal., has been authorized by the California Railroad Commission to re-establish railway service on certain portions of its San Jose Avenue and High Street lines in the city of Alameda. Discontinuance of these portions was authorized by the commission recently during a 90-day experimental period for the operation of buses.

Enviable Safety Record in Philadelphia

A reduction of 15 per cent in all types of accidents in 1927 over the record of 1926 was effected by the Philadelphia Rapid Transit Company, Philadelphia, Pa., in its handling of trolleys, buses and cabs. There were fewer car collisions and a general reduction in the number of accidents on all the surface lines. The record of one-man cars was better in this respect than that of two-man cars.

Scioto Valley Line Tells of Service to Theater



The Scioto Valley Railway & Power Company, Columbus, some time ago took advantage of a combination of circumstances to put over a very effective newspaper ad in connection with the opening of the Loew's and United Artists' Theater in Columbus, Ohio. By means of the electric railway persons living in the most distant towns reached the theater within a few hours.

The ad, which is shown herewith, tells of the new chair cars recently put in service by the company, together with the many other features installed in recent months. In addition the ad contains a picture of Gloria Swanson, one of the United Artists' stars, affiliated with Mr. Loew in the management and direction of the theater.

\$47,000,000 in Loans Before Philadelphia Voters

Voters at the April primary in Philadelphia, Pa., will be asked to approve several lcan bills, totaling \$47,000,000. They also will have for consideration a referendum transferring the \$10,000,000 loan of 1913 for the Chestnut Street subway to another purpose.

Largest of the loan items is \$10,000,000 for the extension of transit facilities. Of that amount \$6,000,000 will be for the structural changes at City Hall station of the Broad Street subway, including the proposed concourse, and \$4,000,000 will be spent for the Ridge Avenue delivery loop.

Sightseeing and Route Guide of Chicago

The Chicago Surface Lines has issued a new sightseeing and route guide of the system. The booklet, $5x8\frac{1}{2}$ inches, contains 36 pages with a folder map in four colors showing the entire system. It is profusely illustrated. Directions are given for reaching all important points of interest by street car and a complete description of all of the routes of the system is included.

of the system is included.

A feature of the distribution is the compilation of the dates of approaching conventions with the name of the secretary of the organization. A month before the convention is to meet, samples of the book are forwarded to the secretary with the suggestion that copies are available to the delegates. In this way practically all who come to the conventions are supplied with street car route guides. The booklet is being distributed free through the medium of railroads, hotels and public service offices.

Transfer Changes in Indianapolis Continues

Continuance of the present 2-cent transfer charge of the Indianapolis Street Railway, Indianapolis, Ind., for an indefinite period from March 1 is asked in a petition filed by the company with the Indiana Public Service Commission. The commission extended the privilege about a year ago following its authorization of the charge in 1925 to assist the company to bolster up its depleted finances. The company states similar conditions affect the property.

New Schedule in Terre Haute Sought

Permission has been asked of the City Council at Terre Haute, Ind., by the Terre Haute, Indianapolis & Eastern Traction Company, to lengthen its schedule on all city car lines and to stop the regular schedule after 11:30 o' clock p.m. The request is made to enable the company to cut down operation expense rather than to raise the fare charge. It is estimated that if the change is granted, a big saving

will be made each month. The schedule, as requested, would start the first morning car on all city lines at 5 o'clock, with a second at 5:30. Then cars would start operating in all directions on a basis of no less than eight minutes nor more than twelve minutes.

Fare Increase in Tulsa

An increase of 3 cents in single cash fare was granted the Oklahoma Union Railway in Tulsa, Okla., on Feb. 15, by the Corporation Commission. The increase makes a single fare of 10 cents or three checks for 25 cents, which is the same rate charged on the buses of the Union Transportation Company of Tulsa, a subsidiary of the Oklahoma Union Railway. The old fare was 7 cents or four checks for 25 cents. No protest was offered and the commission granted the increase from the bench. The company, in its application for a fare increase, alleged that it lost \$377,152 since 1923.

San Antonio Boasts of Service Record

In its elimination of delays the San Antonio Public Service Company, San Antonio, Texas, boasts of its 1927 record. There was an average of 24 delays a day in 1926, against fen a day last year. The cars traveled about 3,500,000 miles in 1927 and during the entire year were delayed only 3,650 times. These were consequent to parades, traffic congestion and automobiles. Figured in another way the statisticians declare that for every person annoyed or inconvenienced by street car delays in 1927 more than 419 enjoyed practically perfect service.

Fare Bill Favors Norfolk

The City Council of Norfolk, Va., has approved a bill to be introduced in the General Assembly confirming the power of the State Corporation Commission to exercise jurisdiction over services and rates of the Virginia Electric & Power Company in its operation of the electric railways in Norfolk.

The right of the State Corporation Commission to fix rates and prescribe services for electric railways in Virginia has been upheld by the Supreme Court, but the Norfolk city charter has a provision at variance with the Supreme Court's ruling in the matter. The purpose of the bill approved by the Council is simply to remove this discrepancy so that the railway's bonding power will not be reduced.

Foreign News

Poland Completes New Electric Railroad

Operation of the new electric railroad between Warsaw and Grodzisk, Poland, was begun recently. This is the first electric railway to be constructed in the country of Poland since the World War.

The distance between the two towns is 33 km. (20½ miles) and the scheduled running time is 66 minutes, with two trains per day each way. The cost of a one-way ticket is 2.30 zlotys (approximately 25 cents), but it is expected that the tariff will be reduced shortly and the service augmented.

The line was constructed and is operated by the Soc. Anon. Silia i Swiatlo (Power and Light Company). British and Belgian interests are closely allied with the Polish company and most of the equipment has been purchased from the countries named.

Individual Good Relations Work

The London Underground Electric Railways has recently been conducting a house-to-house canvass among its commuters, to collect suggestions for improvement. The calls are made by inspectors who are men carefully chosen for their tact and other necessary qualifications. In one district, they made 13,000 calls, and in another, 1,100. They make their visits in plain clothes, gen-

erally in the evening, when it is expected that the head of the family will be at home.

Siam Electrification Completed

The Societe des Tramways et Electricite de Bangkok has lately completed the work of electrifying the Paknam, Siam, steam railroad. To supply the necessary electric power a new 5,000-kw, steam turbo-generator has been installed.

Latest British Traction Contracts

Among the latest contracts placed in Britain for electric railway equipment is a repeat order of the Sydney Suburban Railways for motor-coach and trailer-coach equipments from the Metropolitan Vickers Electrical Company. The motors, two for each motor coach, are units of 360 hp.—probably the most powerful individual motors ever installed for multiple unit trains. Another order from the Sydney Suburban Railways is for more than 100 control equipments for converting non-driving into driving motor coaches. For the Dutch Railways a repeat order has been received for 50 motors, complete with gears, further control equipments, pantographs, and various details. The motors are of 210 hp. each, for operation at 1,500 volts.

Following the order placed in January, 1927, for 104 motors of 230 hp.

each for the Barcelona-Manresa electrification of the Norte Railway of Spain, a further order has now been placed for similar motors for the 1,500-volt electrification of the Irun-Alsasua section. As in the former case, the coaches will be manufactured by the Sociedad Española de Construcción Naval (the Spanish Associate of Metropolitan Vickers) at its Bilbao works.

Edinburgh Adopts Upholstered Seats

Refitting of the top decks of 162 tramcars with upholstered seats has been authorized by the Edinburgh Tramways Committee, Edinburgh, Scotland. Thirty cars also are being fitted with transverse upholstered seats in the lower saloons. Mr. Pilcher, the tramways manager, said that everything should be done to keep the cars attractive and up to date, and that the Tramways Committee should not hesitate to spend money in improving the rolling stock.

First Subway in Far East Opened in Tokio

The first electric subway train service in the Orient was opened in Tokio on Dec. 30 last. The line has been constructed on the pattern of the New York system, and is claimed to be earthquake-proof. At present this subway is $1\frac{1}{2}$ miles in length. It connects the railway terminus of Ueno with the pleasure quarter of Asakusa. It will eventually be extended for 9 miles westward into the suburbs.

International Exhibition at Liege

An international exhibition of the heavy industries will be held at Liege, Belgium, in 1930. It will celebrate the centenary of the independence of Belgium. Railways and transportation will be included, and there will be an exhibit of electric railway equipment and apparatus.

May Combine in Glasgow to Meet Bus Competition

Steam and electric railways may combine forces in Glasgow in an effort to adopt a scheme to control passenger traffic because of the competition on the bus lines. The London, Midland & Scottish Railway and the London & North Eastern Railway, which between them own and work all the steam railways in Scotland, have applied to the Glasgow Town Council for a conference to discuss the terms of a possible alliance between the parties for the purpose of defending the railways and tramways against bus competition. To do this the letter suggested the adoption of some method of co-operation for the control of passenger traffic. The tramways committee appointed seven of its members to meet representatives of the railway companies as requested in an effort to find a solution.

Recent Bus Developments

Staggering the School Load in British Columbia

Officials of the traffic department of the British Columbia Electric Railway, Vancouver, B. C., have been facing a very big transportation problem since the autumn of 1925 when the University of British Columbia moved to its permanent site. A service of motor coaches was started to connect with street cars at the Sasamat terminus and special low rates were arranged. The big difficulty arises from the fact that 1,700 students have to be transported from the railway terminus to the University in approximately 30 minutes each morning during the term. The traffic is light during the rest of the day as the students leave at different times. It would therefore be a considerable loss to operate a sufficient number of coaches to handle the rush traffic during the morning period, as these vehicles would have to be purchased specially and would be idle for more than twenty-three hours during the day, and for the entire time during vacation periods.

The officials of the University laid their case before the faculty of the University and suggested that the term which students travel be extended by fifteen minutes. It was a matter of indifference to the British Columbia Electric Railway whether this change in arrival time be made to an earlier or a later hour, so long as it would serve the purpose of spreading the arrival time of students at the University before 8.45 a.m. upon mornings that their timetables include lectures in English 1, physics 1, or physics 2. This arrangement will be tried for the period of one month.

Dean Coleman, on behalf of the faculty, has recently written to the railway and expressed the appreciation of the authorities to the excellent service maintained by the company during the recent snow. He states that the faculty feared it would be impossible to hold the examinations before Christmas owing to the difficulty of running coaches during the heavy snow, but because of the manner in which service was maintained the examinations were held as usual.

Extension in St. Louis Approved Despite Railway Objection

Approval of the extension of the Kings Highway line of the People's Motorbus Company from Penrose Street northward to Florissant Avenue was given by the St. Louis, Mo., Board of Public Service on Jan. 24. The extension of the bus line had been opposed by the St. Louis Bus Company and the St. Louis Public Service Company, as the

territory served by the buses is in the path of a contemplated extension of the Lee Avenue division of the railway company.

Bus Ordinance Passed in Berkeley

The City Council of Berkeley, Cal., has approved an ordinance to allow a revocable permit to bus interests, the ordinance to become effective in thirty days.

Several months ago such permission was sought from the Council by a company headed by Postmaster Charles D. Heywood, which stated it would install a system of thirty buses, operating over six districts of Berkeley to connect with the Golden Gate Ferry in West Berkeley, with an 18-cent fare.

The bus line officials held that their system would reach territories not now served by other systems, and would offer frequent service to outlying residential districts.

The new ordinance provides among other things that an application for a permit must specify general routes to be served, the minimum schedule of operation and the various transfer points. The Council is to decide if the need for such service is imminent, and may then issue a permit with a revocable clause. In return for the permit the bus company must pay the city \$10 each month or portion of a month for each bus in operation and must carry fleet insurance to the extent of \$100,000 and post a surety bond of not less than \$10,000.

Both the Southern Pacific Company and the Key System Transit are opposed to the granting of the permits to bus companies.

Jersey Bus Line Sold

The Public Service Co-ordinated Transport is now operating the bus lines of the Morris County Traction Company, the sale of the latter company to the Public Service by the bondholders' committee having been approved on Feb. 20 by the State Board of Public Utility Commissioners. This opens a new territory for Public Service transportation lines extending from Newark to Netcong and embracing upwards of 25 communities with an approximate population of 145,000 persons not including Newark and Maplewood. At present 40 buses will serve the territory.

Some of the principal communities through which they run are Netcong, Stanhope, Port Morris, Ledgewod, Mine Hill, Wharton, Dover, Rockaway, Denville, Mountain Lakes, Boonton, Mount Tabor, Morris Plains. Morristown, Convent, Madison, Chatham, Summit and

Would Substitute Buses on Line in Gadsden

Authority to abandon railway service on Ewing Avenue, Gadsden, Ala., and to establish a line of buses instead has been asked by the Alabama Power Company of the Alabama Public Service Commission. The company agrees to pay \$5,000 towards paving this street. It is claimed that cars over this line no longer pay.

Hearing on Pasadena-Long Beach Service Adjourned

The hearing before State Examiner Williams of the California Railroad Commission covering the question of through bus service between Pasadena and Long Beach by way of Atlantic Boulevard as proposed by both the Motor Transit Company and the Pacific Electric Railway has been adjourned to March 19 and 20 at the Los Angeles headquarters of the State Railroad Commission. During the hearing of Fcb. 9 and 10, held at the City Hall in Pasadena more than twenty witnesses testified.

According to Deputy City Attorney Leonard A. Diethe, who appeared at the hearing, Pasadena is interested in the proposed routing of the buses and the question of applicants securing a franchise, rather than a certificate of public convenience and necessity from the State Railroad Commission.

Grant in Buffalo Opposed by Railway

The International Railway, and its subsidiary, the International Bus Corporation, Buffalo, N. Y., are opposing the granting of a certificate of convenience and necessity to the Van Dyke Motor Bus Company, Buffalo, for the operation of de luxe buses between Shelton Square and the American terminal of the Peace Bridge across the Niagara River in connection with the Buffalo, Fort Erie, Bridgeburg, Ont., interurban service. The railway contends that the bus riders are potential car riders and that there would be duplication of service from Main Street to the Peace Bridge terminal.

New Bus Law in New Jersey in Interest of Co-ordination

A bill has been drawn for introduction into the Legislature of New Jersey to bring about, under the jurisdiction of the Board of Public Utility Commissioners, the thorough co-ordination and unification of electric railway and bus services. Under the present law, electric railways may own and operate buses, but under the conditions imposed, such companies are in some respects considered as separate and distinct utilities, thus preventing complete and efficient co-ordination.

Further, whenever an electric railway substitutes buses for any part of its railway lines, it must now obtain consent for a definite number of buses. regardless of the changing needs of the public. The new bill would provide that in cases where buses are substituted for railway cars, the company, after obtaining municipal consent and the approval of the Board of Public Utility Commissioners, shall operate buses sufficient in number to furnish adequate service, subject, of course, to the jurisdiction of the Board of Public Utility Commissioners and under similar conditions as to revocation as apply to all other buses. This bill further provides the conditions under which rail service may be restored in cases where substitution is made.

Georgia Commission Would Assume Jurisdiction

The Georgia Public Service Commission has taken its first step toward the regulation of bus lines within the state with an order requiring all bus companies to report to it. The order is as follows:

All companies or individuals engaged in transporting passengers or freight over the highways and public roads within the state of Georgia between given municipalities and over the streets and highways of municipalities where fixed routes, schedules and rates are maintained are hereby required to file with the Georgia Public Service Commission, time-tables, schedules and tariffs, showing the service and rates or fares charged for such service over said highways and public roads within the state of Georgia and within municipalities herein enumerated.

Said statement showing service and rates shall also show whether such service has been performed by a corporation or individuals, the amount in all equipment used in such service and, if a corporation, where incorporated. Said showing shall also contain the amount of insurance, if any; the company in which such insurance is carried for the protection of passengers and freight entrusted to such corporation or individuals, and such other information as may be in the possession of such companies or individuals calculated to acquaint the commission with the conduct of the said corporation or individuals.

At two successive sessions of the Georgia General Assembly all attempts to pass legislation regulating bus lines in the state have met with failure, and the present order of the commission is an attempt to bring bus lines under the control of the Public Service Commission without legislative action. Whether this can be legally done is a question which the courts may be called upon to decide.

Already one coach company—the Atlanta Coach Company—has refused to pay its assessment for the support of the commission on the ground that the commission has no power to regulate bus lines in the absence of legislative action. And it is possible that this order will meet the similar opposition from other operators.

Tax of Interstate Buses by Connecticut Upheld

In a decision handed down on Feb. 20, the United States Supreme Court upheld the right of the state of Connecticut to impose a tax of 1 cent for each mile of highway traversed by buses engaged in interstate commerce. The Interstate Bus Corporation, which operates buses between Connecticut and Rhode Island, and to Massachusetts points, had sought in the lower courts to enjoin the State Tax Commissioner from collecting this tax, protesting that it was discriminatory and therefore unconstitutional. The ruling of the district court refusing to grant this relief is now upheld by the Supreme Court.

Justice Stone who handed down the opinion in this case expressed himself as follows regarding the contention that the bus company already contributed toward highway maintenance in its regular taxes:

That Appellant is already contributing to highway maintenance is not in itself significant because the State does not excede its Constitutional authority in imposing more than one form of tax as a charge for the use of its highways in interstate commerce. It is for the Appellant to show that the aggregate charge bears no reasonable relation to the privilege granted.

In concluding, Justice Stone said:

But we need not consider here whether the principle relied upon goes so far as to prevent the State from excluding from its highways, a motor carrier which refuses to pay charges for their use.

The fact that buses operating in intrastate commerce in Connecticut were exempted from this tax and paid instead a gross receipts tax, did not alter the opinion of the court.

Substitution of Line in Oakland Sought

The Key System Transit Company, which was recently authorized by the California Railroad Commission to substitute a bus line for its "Rockridge" Street railway line for an experimental period of 90 days, has applied to the Railroad Commission for permission to substitute a bus route permanently on this Oakland line. This route would make a connection with the Key transbay service.

New Route in Richmond Opened

A new bus route serving the Oak Grove section of Richmond on the southside and the teritory in the vicinity of the Richmond Cedar Works has been put into operation by the Virginia Electric & Power Company. The bus runs on a 30 minute round-trip schedule. Plans for the establishment of the new route have been underway for some time and service was commenced with the completion of street improvements undertaken by the city.

Financial and Corporate

7 per Cent Preferred to Be Retired by Illinois Power & Light

It is proposed by the Illinois Power & Light Corporation, Chicago, Ill., to call and retire all of the 7 per cent cumulative preferred stock. For this purlative preferred stock. For this purpose, it is expected that a formal call will later be issued to redeem the stock at \$105 a share plus dividends.

In order to raise funds with which to accomplish this, the corporation proposed to create and sell a new class of preferred stock. This class will be without par value, will be preferred in involuntary liquidation at \$100 per share and in voluntary liquidation at \$110 per share, plus accrued dividends. The call price will also be \$110 per share. The call price of the existing 6 per cent preferred stock, as well as its price on voluntary liquidation, will be likewise raised to \$110. Otherwise, the new class will have substantially the same charter protection as the existing preferred stock.

This proposed refinancing plan is subject to action of the stockholders at a meeting to be held for that purpose on April 23 and to the approval of the Illinoise Commerce Commission. If adopted, it is expected to result in the following advantages to the company and its stockholders:

1. Most of the holders of the 7 per cent cumulative preferred stock will receive a substantial present profit;

2. The existing 6 per cent cumulative preferred stock (which will remain outstanding) should have its market value materially increased.

3. All holders of 7 per cent cumulative preferred stock will be given an opportunity to reinvest in the new \$6 cumulative preferred stock, on a favorable exchange basis.

4. The company will be materially benefited by the resulting reduction of its dividend requirements.

Every holder of the 7 per cent cumulative preferred stock will have full opportunity to acquire the new \$6 preferred stock, share for share, by exchange, with a substantial cash difference paid to the stockholder who elects to take advantage of the exchange offer.

Abandonment Sought in Fort Smith

Robert C. Coffy, vice-president and general manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., has filed with the city commission a letter asking permission to abandon the company's railway system in Fort Smith and Van Buren on the ground that money is being lost in its operation, and that the company is unable to meet the expenses of paving between its tracks in the \$275,000 street improvement program planned by the city.

The company will consider any sug-

gestion the commission might make for relief in its present crisis. Action has been deferred by the City Commission for further consideration.

Increase in Net Income

Duluth-Superior Company reports increase in total operating revenues with falling off in expenses. Bus service not self-supporting

 $\Gamma^{ ext{HE NET}}_{ ext{Superior Traction Company and}}$ subsidiary companies operating in Dulnth, Minn., and Superior, Wis., was \$107,645 for the year ended Dec. 31, 1927, compared with \$60,796 for the year previous. This and other important results of the year's operation were contained in the annual report recently submitted to the stockholders, and shown in the accompanying statistical statements.

Progress has been made in settling paving claims which had been made by the city of Duluth during the past ten years. The city had brought suit for the sum of \$68,306, being part of the cost of paving two streets in the business section of the city in which the company's tracks are constructed and operated. This suit was finally disposed of on July 15, 1927, by a decision of the Minnesota Supreme Court, affirming an order of the lower court awarding the city of Duluth the sum of \$7,420. Since that decision other paving claims of the city of Duluth aggregating \$36,113 against the company on account of paving have been settled by the payment of \$701. This disposes of all the paving claims against the company by the city with the exception of \$22,787.

On April 11, 1927, the United States Supreme Court handed down its decision affirming the decree of the United States District Court, District of Minnesota, upholding the company's

CONSOLIDATED INCOME STATEMENT OF THE DULUTH-SUPERIOR TRACTION COMPANY

SCIENCE TRACTION COM	AIN I	
0	1927	1926
Operating revenues: Revenue from transportation	\$1,948,393 17,095	\$1,934,636 16,506
Total operating revenues	\$1,965,489	\$1,951,142
Operating expenses: Way and structures Equipment. Power Conducting transportation. Traffic. General and miscellaneous. Transportation for investment-credit.	\$191,529 194,023 176,830 772,140 2,263 241,928 —8,275	\$213,616 235,637 176,183 746,487 1,526 260,065 —11,384
Total operating expenses	\$1,570,441	\$1,622,131
Net revenue from operations	\$395,047	\$329,011
Taxes assignable to operations	\$156,659	\$133,974
Operating income	\$238,388	\$195,036
Non-operating income: Income from funded securities including interest on reacquired bonds issued by The Duluth Street Railway. Income from unfunded securities and accounts. Income from sinking fund and other reserves including interest on reacquired bonds issued by The Duluth Street Railway. Miscellaneous income.	\$22,613 2,043 14,035 31	\$22,284 2,425 14,091 67
Total non-operating income	\$38,723	\$38,869
Gross income	\$277,112	\$233,906
Deductions from gross income: Interest on funded debt. Interest on unfunded debt. Miscellaneous debits.	\$168,175 692 598	\$169,664 2,740 704
Total deductions from gross income	\$169,466	\$173,109
Net income transferred to profit and loss	\$107,645	\$60,796

CONSOLIDATED PROFIT AND LOSS AND SURPLUS ACCOUNT OF THE DULUTH-SUPERIOR TRACTION COMPANY \$642,540

Add:		40.1113.10
Net Income for year ended Dec. 31, 1927	• • • • • • • •	107,645
Discount on bonds purchased for sinking fund Profit on investment securities sold Sundry items.	\$2,052 4,087 609	6,749
		\$756,935
Deduct: Dividenda:		
Duluth-Superior Traction Company Preferred stock. Common stock Duluth Street Railway preferred stock.	\$60,000 35,000 27,793	
26. 11	\$122,793	
Miscellaneous debits: Claims paid-railroad crossing accident, superior Sundry items	\$40,832 207	163,832 \$593,102
Corporate surplus, Dec. 31, 1927:		
Appropriated as follows: Additions to property through surplus. Funded debt retired through surplus. Sinking fund reserve.	\$171,470 356,448 16,098	
Unappropriated	\$544,018 \$49,084	\$593,102

STATISTICAL STATEMENT OF THE DULUTH-SUPERIOR TRACTION COMPANY

Railway and Dus Operations	
Total miles, all track reduced to single	112.62 61.76
Total miles of bus routes	28.77
of bus routes	13,780

right to go into the Federal Courts to protect the property with which it is vested from confiscation.

On July 11, 1927, application was made to the Railroad Commission of Wisconsin for an increased fare in the city of Superior. Hearing on this application was had before the commission on Sept. 26, 1927, and on Dec. 3, 1927, the Railroad Commission of Wisconsin filed its order fixing a rate of fare to be charged in the city of Superior of 8 cents cash, five tickets or tokens to be sold for 35 cents, this rate to become effective Jan. 1, 1928. This order fixes the same rate of fare in the city of Superior as in the city of Duluth.

The report reviews the history connected with the collision between a last passenger train of the Great Northern Railway and a car of the company in Superior on Jan. 6, 1927. This accident being unusual in the experience of the company, the amounts paid in settlement have been charged directly against the company's profit and loss account.

Depreciation has been accrued and charged monthly into operating expenses for the Duluth division in the amount fixed in the order of the Railroad & Warehouse Commission of Minnesota dated Oct. 4, 1926, and on the Superior, Wis., division, at the rate of 2.5 per cent upon an estimated undepreciated original cost of the depreciable property.

Automobile bus service, operated as a feeder to electric railway lines, while justified from a service standpoint, has not proved self-supporting. This service prevented greater loss from operation than would have resulted if street

railway extensions had been constructed and operated.

No general mortgage bonds were authenticated or sold during the year but \$26,000 par value of general mortgage bonds were retired under the sinking fund provision of the mortgage.

Western Pacific After Petaluma & Santa Rosa Railway

The Western Pacific Railroad filed with the Interstate Commerce Commission in Washington on Feb. 10 application for permission to purchase the Petaluma & Santa Rosa Railway. Some weeks ago the Southern Pacific and the Santa Fe, acting jointly, filed with the commission application for permit to purchase this line.

The Petaluma & Santa Rosa company operates a line between those two cities, the other principal city on the line being Sebastopol. The line has 48 miles of trackage, 38 being main line, and the company also operates two steamboats from Petaluma to San Francisco.

In its application the Western Pacific said it was prepared to pay \$90 a share for the common stock, but said it had no contract for such purchase. The financial setup of the short line consists of a \$750,000 bond issue, of which \$590,000 is outstanding, \$1,000,000 in common and \$250,000 in preferred stock. Of the common there is outstanding \$770,700 and of the preferred, \$127,800. The common stock has a market value of \$45.50, and the preferred \$87.50.

Conspectus of Indexes for February, 1928

Complied for Publication in This Paper by
ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

		Month	Year	Sinc	e War-
	Latest	Ago	Ago	High	Low
Street Railway Fares* 1913 = 4,84	Feb.	Jan.	Feb.	Feb.	May
	1928	1928	1927	1928	1923
	7.59	7.59	7.45	7.59	6.88
Electric Rallway Materials* 1913 = 100	Feb.	Jan.	Feb.	Sept.	Feb.
	1928	1928	1927	1920	1928
	139.5	140.6	154.0	247.5	139.5
Electric Railway	Feb.	Jan.	Feb.	Sept.	March
Wages*	1928	1928	1927	1920	1923
1913 = 100	228.6	228.6	226.7	232	206.8
Am. Elec. Ry. Asan. Construction Cost (Elec Ry.) 1913 = 100	Feb.	Jan.	Feb.	July	May
	1928	1928	1927	1920	1922
	200.9	200.9	202.9	256.4	167.4
Eng. News-Record	Feo.	Jan.	Feb	June	March
Construction Cost	1928	1928	1927 -	1920	1922
(General) 1913 = 100	201 .6	203.9	210.2	273.8	162.0
U. S. Bur. Lab. Stat. Wholesale Commod- ities † 1926 = 100	Jan. 1928 96.3	Dec. 1927 96.8	Jan. 1927 96.6		
Bradstreet Wholesale Commodities 1913 = 9.21	Feb. 1	Jan. 1	Feb. 1	Feb. 1	June 1
	1928	1928	1927	1920	1921
	13.53	13.57	12.52	20.87	10.62
U. S. Bur. Lab. Stat.	Jan.	Dec.	Jan.	July	March
Retail Food	1928	1927 I	1927	1920	1922
1913 = 100	155.1	155.97	159.3	219.2	138.7
Nat. Ind. Conf. Bd. Cost of Living 1914 = 100	Jan.	Dec.	Jan.	July	Aug.
	1928	1927	1927	1920	1922
	163.1	163.6	166.9	204.5	154,5
Steel Unfilled Orders	Jan. 31	Dec. 31	Jan. 31	July 31	May 31
(Million Tons)	1928	1927	1927	1920	1927
1913 = 5.91	4.276	3.973	3.800	11.118	3.951
Bank Clearings	Jan.	Dec.	Jan.	Oet.	Feb.
Outside N. Y. City	1928	1927	1927	1925	1921
(Billions)	19.73	19.89	18.89	20.47	10.43
Business Fallures Number Liabilities (Millions)	Jan. 1928 2178 54.03	Dec. 1927 1820 51.06	Jan. 1927 2227 74.27	Jan. 1924 2231 122,95	Ang. 1925 1353 27.22

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

†This index is changed to a base of "11926 — 100." These

men employed on these roads.

†This index is changed to a base of "1926 = 100." That notation replaces the former basis of "1913 = 100." Inasmuch as the bureau has not calculated the index on this new base any further back than January, 1923, no figures are shown in this tabulation for the high and low points since the war. It is planned to compute the index on the new basis as far back as January, 1913. Until such time as the bureau makes public these figures for the earlier years this information will be lacking.

Seattle Doing Better

Declaring that the "tide has turned in the affairs of the municipal street railway," Mayor Bertha K. Landes, of Seattle, Wash., further states that for the first time in nine years the city has owned the system "the future really looks hopeful." Mayor Landes declares that the people of Seattle have good reason to be gratified at the results obtained for the railway in 1927, and that the "railway is making substantial progress toward financial stability." Some facts which she quotes as encouraging follow:

1926 \$5.741.029	1927 \$5,703,873
5,015,887	4,765,845
\$725,142 18,179	\$938,027 26,598
\$743,321 698,841	\$964,625 665,382
\$44,480	\$299,243
	\$5,741,029 5,015,887 \$725,142 18,179 \$743,321 698,841

The net income of the railway for 1927 was \$299,243, compared with \$44,480, during 1926, due to economies put into effect during the year.

For several years the cash revenues have been decreasing, but the decrease in revenue for 1927-1926 was only one-seventh as great as for 1926-1925.

As the Mayor sees it the large jump ahead in net income will go a long way toward reducing the railway deficit of \$694,153, and it is probable that when the years' accounts have been checked by the city comptroller, this deficit will have been reduced by nearly one-half.

Mayor Landes states that the improved financial condition of the railway has enabled the department to reconstruct the tracks in places where work had been deferred on account of lack of funds, and to introduce the 5-cent fare loop cars in the business district.

With her statement, Mayor Landes gave out the accompanying comparison.

Mortgage to Secure Advances Refused

In refusing to sanction a bond and motgage of \$308,558 to be executed by the Phillipsburg Transit Company, Phillipsburg, N. J., to the Lehigh Valley Transit Company, Allentown, Pa., the Board of Public Utility Commissioners of New Jersey has announced there is no immediate likelihood of the Phillipsburg company earning even part of the interest which the bonds would bear.

The Phillipsburg Transit Company is owned by the Easton Transit Company, the stock of which is owned in turn by the Lehigh Valley Transit Company.

For some years the Phillipsburg company has been unable to meet all its pecuniary liabilities and has been partially dependent for operating and other expenses upon the Lehigh Valley Transit. The latter is still providing funds to continue operations, but asked for a mortgage to protect itself. The commission said it is not apparent that the creation of mortgage indebtedness would place the Lehigh Valley Transit in any better position than it now occupies.

Revenue Increase on Washington Railway

The total amount of money credited to profit and loss during the year 1927 by the Washington Railway & Electric Company, Washington, D. C., was \$760,019. This was disclosed in the annual report to the stockholders submitted at the annual meeting on Jan. 21. Earnings and expenses for the year ended Dec. 31, 1927, are shown in the accompanying table.

Aside from dividends from the Potomac Electric Power Company, included above, no income was received by the Washington Railway & Electric Company on its investment in stocks of

subsidiary companies.

During the year the company's system carried 99,665,934 passengers, of whom 23,916,630 were carried on transfers, leaving 75,749,304 revenue passengers. In 1916 there were 76,797,163 revenue passengers, indicating a decrease in 1927 of 1,047,859. The report states that other cities within close proximity of Washington showed decreased patronage, that although traffic had been falling off almost constantly since 1920 it fell off to a considerably less degree in the past three years than formerly. Further, that appreciation of the street car as "the most eco-nomical means of transport with the highest relative value in handling mass transportation" and as "indispensable in urban communities" was growing throughout the country, with the result that consideration for the rapid and safe movement of street cars was being given in the formulation of traffic regulations.

Largely due to the enjoyment of a great increase in chartered bus service, and relatively more passengers paying their fare in cash than formerly, the loss in revenue through the decrease in revenue passengers carried was wholly overcome, with the result that operating revenues in 1927 increased \$18,898. This, together with further economies in operation, brought about an increase of \$78,601 in operating income

The amount expended in 1927, for the proper upkeep of track and roadway, together with allowances for depreciation, was \$866,191. The major projects covered the reconstruction during the year of 1.61 miles (8,510 feet) of underground conduit track, and 3.85 miles (20,306 feet) of overhead trolley track, at a total cost of \$311,678.

The popularity of the fifteen modern cars, with automatic rear-exit doors and leather covered deluxe seats, purchased in June, 1926, reflected itself in a very satisfactory increase in revenue and convinced the company, so it claims, of the desirability of having similar equipment on the twelve new one-man cars ordered in 1927. These cars are to cost \$175,000 and delivery is to be made in February, 1928. The company is also equipping 41 other one-man cars with automatic rear exit doors at a cost of \$46,750.

In connection with its railway lines, the company is operating 70 buses, over routes having an aggregate mileage of 58.3 miles. Twenty of these buses were purchased in 1927 at a cost of \$139,806, making the total investment now in buses \$487,797. In the last report the company mentioned that since bus service was started in May, 1922, the expenses of operation had exceeded the receipts by \$175,916, but that the results for 1926 offered more encouragement. This opinion had been borne out by the results for 1927, which showed the receipts approximately \$2,400 in excess of operating costs.

The safety contest opened in February, 1921, is still being carried on. There was a reduction of more than 7 per cent in the number of accidents in 1927 compared with 1926, and a

CONDENSED STATEMENT OF THE WASHINGTON RAILWAY & ELECTRIC COMPANY FOR YEAR 1927

Total credited to profit and loss during the year..... \$760,019

reduction in the amount paid in the settlement of damage claims and suits of \$30,676. Efforts of the company in drawing the attention of its employees to the need of care in all street movements, and the high degree of operating efficiency in which the equipment has been maintained have all aided in bringing about this splendid showing. Greater efficiency in operation, together with improved condition of the equipment and track, has also brought about a decrease in interruptions to service. The number of detentions decreased 17 per cent and the time lost in detensions decreased 30 per cent.

On the subject of the District of Columbia merger President Ham said that conferences were in progress and it was hoped that some plan fair alike to the public and the holders of the securities of the companies involved might be devised.

The outstanding bonded debt of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, is now \$24,120,700. Adding this to the \$15,000,000 capital stock of the parent company, and \$7,002,850 outstanding capital stock of subsidiary companies, makes the total outstanding capitalization as of Dec. 31, 1927,

\$46,123,550. This excludes bonds purchased for the sinking fund and for temporary investment.

For the year 1927 the total payroll of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, was \$4,960,298, an increase of \$166,157 over that of the previous year. The number of employees in the service of the company's system is now 2,976, of which 2,139 are members of the Washington Railway Relief Association. This organization, in conjunction with the company, has continued the group life insurance of its members. This plan has now been in effect almost seven years, and during the period 67 payments, aggregating \$81,911, have been made to beneficiaries. The relief association expended \$12,433 in sick benefits to its members, and, together with the Washington Railway & Electric Company, is now paying pensions to its members aggregating \$38,140 annually.

The number of stockholders at the close of 1927 was 2,021 of whom 1,159 were women, trustees, charitable, beneficial, religious and other similar organizations.

Some Recent Results in Toledo

Street Railway Commissioner Graumlich at Toledo, Ohio, reported that the first week in March would see sufficient money in the sinking fund to retire bonds up to 20 per cent of the total capital value of the Toledo Traction Company and, therefore, after that time the sinking fund would cease to operate. The company has a total capital value of \$9,096,940 of which \$1,820,000 will he retired early in March.

This will throw about \$27,000 a month into the picture and with other economies will soon be reflected in surplus credits to the stabilizing fund in which there is an accumulated deficit of \$1,272,369, in addition to the \$400,000 originally set up.

Bus operations has begun to show a profit under the plant of awarding as revenue to the feeder lines all of the revenue collected from passengers and half that collected on cars from passengers turned over to the feeders. Under this accounting plan the gross profit from coach operation for January in Toledo was \$3,450.

Abandonment of Fulton Line Allowed

Abandonment of the Fulton, N. Y., city line of the Empire State Railroad Corporation was approved by order of the Public Service Commission recently. Evidence before Commissioner Brewster showed that the line paid until bus operations were established in the same territory. Without considering taxes or interest charges, there was a deficit in 1926 of \$1,239, and for the first six months of 1927, \$1,127.

Personal Items

D. J. Torrance Promoted in Seattle

D. J. Torrance, assistant comptroller in the Seattle offices of the Stone & Webster Corporation, a position he has held since 1925, has been named secretary-assistant to A. W. Leonard, president of the Puget Sound Power & Light Company. Mr. Torrance has had wide experience in public utility operation and in finance to qualify him for the

range of his new duties.

A native of Georgia, he was early identified with the Key West Electric Company and the El Paso Electric Company. Later, he went to Peking, China, for seven years where he served as Chinese representative of the American International Corporation. He is a life member of the Peking Club, was president of the American Association in Peking and for many years has been an associate member of the American Institute of Electrical Engineers. When conditions became chaotic in China. Mr. Torrance returned to the United States and for one year was in the Boston offices of the Stone & Webster Corpo-

W. H. Taylor Heads Philadelphia Electric

William H. Taylor, vice-president in charge of operations and maintenance of the United Gas Improvement Company, was recently elected president of the Philadelphia Electric Company. Immediately after the announcement of his election to the presidency, Mr. Taylor, who has had twenty-five years' experience in the public utility industry, said he had resigned as vice-president of the United Gas Improvement Company.

Mr. Taylor, well known in utility circles as an expert in appraisal and rate matters and in general consulting engineering work, and a former vicepresident and general manager of the Georgia Railway & Power Company. Atlanta, was elected vice-president of the United Gas Improvement Company early in 1927. He began his career in 1903 as a constructor with the United Gas Improvement forces. Mr. Taylor was graduated from the Stevens Institute of Technology.

F. I. Hardy Leaves Boston & Maine

F. I. Hardy, assistant to the president of the Boston & Maine Railroad, has resigned to become president of the Woodbury Granite Company of Vermont, with headquarters at Burlington. Mr. Hardy had charge of the Boston & Maine's motor trucking activities.

The electric railway business had years of his career. claimed many Prior to his affiliation with the Boston & Maine in 1924 he served as manager of the Chelsea District of the Eastern Massachusetts Street Railway. In the past he was identified with the Union Traction Company of Indiana, the Fort Wayne & Northern Indiana Traction Company, the Chicago, South Bend & Northern Indiana Railway, the Southern Michigan Railway and the Northern Ohio Traction & Light Company of Akron, now known as the Northern Ohio Power & Light Company.

C. R. Bendell General Manager at Wheeling

C. R. Bendell was recently appointed general manager of the Wheeling Public Service Company, Wheeling, W. Va.



C. R. Bendell

He has been connected with this property, which operates railway, bus and power service, for several years in the capacity of dispatcher, division superintendent, head of the claim department and maintenance of way and equipment. Later he became general superintendent. With keen powers of observation and a long and valuable experience in Wheeling he is prepared to take over the managerial duties incident to his recent promotion. The territory in which the company of which Mr. Bendell is a part operates has, particularly since the war-time period experienced phenomenal growth.

Mr. Bendell was born in Martins Ferry, Ohio. He received his early education in the public schools of that state. At an early age he went to Wheeling and entered the utilities field in a minor position.

Changes in Louisville

At the general meeting following the stockholders meeting of the Louisville Railway, Louisville, Ky., on Feb. 15, the following changes were made in the operating staff.

Samuel Riddle, was elected secretary and now carries the title of vicepresident and secretary.

E. F. Kelley was appointed assistant secretary and assistant treasurer, in addition to his duties as purchasing agent and private secretary to President J. P. Barnes.

Mrs. Anna L. Humphrey was appointed treasurer. In June, 1927, following the death of Samuel G. Boyle, for many years secretary and treasurer of the Louisville Railway, Mrs. Humphrey took over the duties of the treasury department as assistant treasurer.

Mrs. Humphrey was connected with the auditing department of the United Traction Company, Albany, N. Y., from 1918 until 1922. In 1922 she was located in Louisville, Kentucky, as auditor of the Inland Waterways Company. This company operated a line of steamboats and barges on the Ohio and Kentucky Rivers, between Pitts-burgh, Beattyville and St. Louis. On Jan. 1, 1926, she became auditor of the Louisville Community Chest, which represented forty-three social and charitable agencies in the city of Louisville.

J. H. Ward at Port Arthur

J. H. Ward was recently made assistant superintendent of transportation, Eastern Texas Electric Company, Port Arthur Division, Port Arthur, Tex. He entered the service of this company at Beaumont in 1917. Two years later he was appointed supervisor and in 1927 he assumed charge of the Beaumont-Port Arthur Bus Line route. On Jan. 21 of this year, he was transferred to Port Arthur. His excellent record while in Beaumont resulted in his being selected to the post at Port Arthur upon the purchase of the Port Arthur Traction Company's physical properties by the Eastern Texas Electric Company. This purchase became effective on Jan. 22.

Obituary

Richard A. Berry

Richard A. Berry, assistant engineer of the Board of Transportation, New York, N. Y., died on Feb. 18. He was engaged in engineering and construction since 1899. Mr. Berry's service as assistant engineer with the Public Service Commission, the Transit Commission and the City Board of Transportation was mainly on the construction of the subway stations in the Bronx. His latest work in that field was the construction of the enclosed passenger transfer connection between the elevated lines and the subway lines at 149th Street and Third Avenue.

Mr. Berry attended Fordham University and Manhattan College and was graduated with the degree of bachelor

of science and civil engineer.

Manufactures and the Markets

Use of Simplified Invoice Form Steadily Increasing

By RAY M. HUDSON,

Assistant Director Commercial Standards, Bureau of Standards, Dept. of Commerce, Washington, D. C.

With the view to reducing avoidable waste in office operations, several nationally known trade associations and business organizations co-operated in producing the simplified invoice form which was brought out a year ago. The group includes the National Association of Purchasing Agents, Railway Accounting Officers' Association, National Association of Cost Accountants, Controllers' Congress of National Retail Dry Goods Association, also several prominent manufacturers. The Division of Simplified Practice of the United States Department of Commerce, in response to the request of the above-interested parties, acted as a co-ordinator for the group and is now assisting it in promoting the application and use of the form.

To date, the simplified invoice has been accepted by 27 well-known trade associations. Countless prominent firms and corporations have accepted this form as their standard. Others say they will do so when stocks of their present individual forms run out. The experience

of several firms is that each day's mail brings in a few more invoices on the simplified form.

As might be expected with a project of this kind, some companies find a problem in substituting the simplified invoice form for the invoice form they are now using. This problem naturally divides into two phases—one dealing with outbound invoices, the other with inbound.

bound invoices, the other with inbound.
Consider the outbound invoice. The company rendering the bill naturally prefers to do its billing on one form, and preferably one which will not only meet its own needs in the circumstances, but will also be acceptable to the recipients. When the issuing company is requested to use the purchaser's supplied form, there arises the problem of training billing clerks to put the data on each individual form, a consequent slowing down of the clerk's output, possible delay due to running out of stock of a customer's form, also risk of return of invoice by the recipient because the information is incorrectly placed on his special form. Add to this the yards of correspondence, hours of dictation and stenographic effort, the reams of paper, the dollars of postage, and all the other costs necessary to clear up misunderstandings, and the probabilities are that the cost-to-issue per invoice soon reach an amount out of proportion to the

Exhibitograph No. 3 CHEERIO!

Why has the Manufacturer Membership in the A.E.R.A. grown from

244 in 1922 to 445 in 1928?

Because A.E.R.A. members secure value received for their money. Think it over, but don't forget to plan early for your Cleveland Exhibit.

Sept. 22-28

real value of this kind of customer-accommodation.

There is also the question as to whether the issuing company is in duty bound or under any special obligation to render such peculiar and special service to a customer. Billing on customer's forms is usually done as a matter of good will, or courtesy. Obviously the customer buys the goods for their ability to meet his requirements, and not because of the vendor's willingness to render his bills on the customer's forms. Imposition on vendors of costs which normally belong to the customer means those costs usually find their way back to the customer in the price he pays for the goods he buys.

Consider the inbound invoice. Under former conditions, a company buying from 100 vendors was likely to receive nearly 100 different invoice forms, each varying from the other in size, spacing, arrangement of material on the face of the form, etc. Undoubtedly, the desire to get away from the troubles resulting from too many different forms prompted many purchasing agents to request their vendors to submit their bills on the form furnished by the purchaser. It would seem both possible and practicable in many instances to pass the simplified invoice through exactly the same routine through which the purchaser's present form passes. Through the use of the simplified form, the customer is freed from the bother and worry, also the expense of keeping his vendors properly stocked, with his own company's forms.

Lightweight Cars for Knoxville

Plans for the twelve city-type passenger cars which were ordered by the Knoxville Power & Light Company, Knoxville, Tenn., have been released. Mention of the order was made in this paper, issue of Nov. 5. The cars will be of the one-man, double-truck type for single-end operation. They will be of semi-steel design and will have an over-all length of 43 ft. 9 in. The total weight will be 30,000 lb. and the cars will seat 54 passengers.

The principal dimensions of the cars

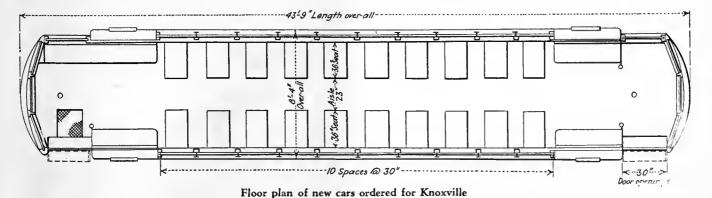
are given herewith, along with a floor plan. Complete specifications were published in the issue of Dec. 10.

GENERAL DIMENSIONS

Length over dashers42 ft. 2	in.
Length over body33 ft. 6	in.
Length of platform4 ft. 4	
Rail to top of trolley board 10 ft. 5 16	in.
Rail to bottom side sill28 fg	
Rail to first step	
First to second step10	in.
Second step to platform8	
Bumper extensions6	
Post centers30	in.
Clear height Inside	in.
Width of seats	
Width of aisle	in.
Door openings clear30	in.
Truck centers (approximately) 24 ft. 0	in.
Wheelbase 5 ft. 0	
Size of wheel	

GENERAL INFORMATION

	capacity																
	finish .																
Type be	olster								E	36) 2	C	G	ir	·d	eı	ď



Purchasing agents willing to test the simplified invoice will find many vendors ready to render their bills on that form. All the purchaser has to do is to request the vendor to "Render all bills on the simplified invoice form."

Not long ago 35 business corporations of average size were asked to estimate what, in the opinion of their officers, might be saved in their purchasing and accounting departments if all invoices received by them were on a national standard invoice form. If these corporations estimated correctly, the annual saving of 25,000 concerns of corresponding size in the United States, Canada and Mexico would amount to \$15,500,000. If we discount this figure for the purpose of being conservative, the potential savings would still run into the millions of dollars.

The Department of Commerce, through its Division of Simplified Practice, heartily commends the Simplified Invoice to all vendors and purchasers for their careful consideration, believing a fair and adequate trial of this form will quickly demonstrate its merits and values.

[An article describing the simplified invoice, together with a reproduction of the standard form, appeared in this paper for April 23, 1927, page 760.— EDITOR.]

Attractive Book Issued by Hyatt Roller Bearing

Hyatt Roller Bearing Company, a division of General Motors, Newark, N. J., has published an attractive book with illustrations entitled "Hyatt Equipped Railroad Journal Boxes." The cover design is tan with a darker shade of brown, with an illustration in the center which depicts a locomotive with a mountain in the background. The book contains 44 pages; is replete with illustrations brown over tint and thoroughly takes up the use and advantages of the company's roller bearings.

Among the subjects in the table of contents are: "Hyatt Roller Bearing Railroad Type," "Actual Performance," "The Economic Phase," "Comparative Starting Torque," "Safety and Reliability," and "In Interurban and Street Railway Service." The style of the book is clear and concise with the essentials of the subject kept in the foreground. It contains a picture of the inventor, John Wesley Hyatt, and also of the company's plant at Harrison, N. J., adjacent to Newark.

Banquet Marks Closing of Carhouse

The Gates-lane carhouse of the Worcester Consolidated Street Railway has been closed and the cars have been transferred to the new house and yards on Grove Street. Men employed at the carhouse for years had a banquet to mark its passing. The closing of the Gates-lane carhouse has resulted in centralizing the equipment of the company

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

Feb. 21, 1928

Metals-New York

Copper, electrolytic, cents per lb	13.775 16.125 6 225 5.80 51.375
Situminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton	
Roads, gross tons	• • • • • •
Somerset mine run, Boston, net tons	• • • • • •
Pittsburgh mine run, Pittsburgh, net tone.	1.825
Franklin, Ill., screenings, Chicago, net tons	1.575
Central, Ill., screenings, Chicago, net tons. Kansas screenings. Kansas Citv. net tons.	2. 125
Materials	
Rubber-covered wire, N. Y., No. 14, per	
1,000 ft	5.30
Weatherproof wire base, N.Y., cents per lb.	16.50
Cement, Chicago net prices, without bage	2.05
Linseed oil (5-bbl. lots), N. Y., cents per lb	10.2
White lead in oil (100-lb, keg), N. Y., cents	
per lb,	13.25
Turpentine (bbl. lots), N. Y., per gal	U. 64/2

and has created the necessity of rearranging runs. The Consolidated has recently constructed a bus garage and modern carhouse on the Grove Street property which for many years was used as a storage yard. It is planned to make "running repairs" at the new carhouse while the Market Street carhouse, which is now the only other one of the trolley company in use, will be used for the major repairs.

Cincinnati Car Pleased at Prospects Ahead

For the first time since the reorganization of the Cincinnati Car Company on Oct. 1, 1926, stockholders of the company met recently and received the report of the officers as to operations in the last quarter of 1926 and the full twelve months of 1927.

President Sanders referred to 1927 as "a lean year in which the dividends requirements of \$328,805 were earned and also a small amount carried to surplus."

The condensed statement of income and surplus for 1927, showed current assets of \$1,542,176 and current liabilities of \$209,191. The gross income for that period was \$2,040,802, the net income \$343,748, dividend disbursements \$328,805 and the sum of \$14,943 carried to surplus.

The company now has orders in sight for 119 cars as against 68 cars built last year. Mr. Sanders said:

Today it is the almost unanimous belief of railway operators, and I might say city officials also, that, while the bus can be used to advantage in many places, it cannot supplant the rail car in handling mass transportation.

Operators generally are, however, convinced that there is an increasing demand for speedier and more comfortable city and interurban cars, and those with foresight, such as we see in Cincinnati, are meeting the demand by re-entering the market for new and improved cars.

A very large majority of the population of our cities rides in street cars because they are safer, more comfortable and cheaper than other public carriers, and yet this vast majority has been unwittingly discriminated against by municipal authorities in favor of the private automobile owner who not only uses more than his share of the streets when traveling, but uses them for storage purposes as well, and thus selfishly impedes all street traffic.

Redecorated Cars Scheduled to Go Into Service Feb. 19

Refurbished and wholly redecorated street cars were scheduled to be placed on the Northeast-Woodland street car line of the Kansas City Public Service Company, Kansas City, Mo., on Feb. 19, according to a recent report. The shops are turning out two rebuilt cars a day. The entire overhauling of the existing equipment will be finished by July 1, it is estimated.

40 Electric Locomotives for Paris-Orleans Railroad

Oerlikon-Batignolles Company has recently supplied 40 electric locomotives to the Paris-Orleans Railroad. Both passenger and freight locomotives are represented in this order.

ROLLING STOCK

Boston Elevated Railway, Boston, Mass., has accepted delivery on one 29-passenger Mack four-cylinder, city type bus.

EASTERN MASSACHUSETTS STREET RAILWAY, Boston, Mass., has recently ordered a Fageol (A.C.F.) urban coach.

SHOPS AND BUILDINGS

GENERAL TIRE & RUBBER COMPANY, Akron, Ohio, has announced that it has just completed purchase of ground, and has started plans for a modern office and warehouse building at Kansas City, Mo., and that the cost of the site and building will be about \$200,000.

TRADE NOTES

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, has appointed O. D. Fries as salesman in charge of consumer motor business in the Detroit territory under the direction of J. M. Robinson, district manager. Mr. Fries was eduvated in the Glasgow Royal Technical College and the University of Glasgow, Scotland. Since he was graduated he has had much experience in practical and theoretical enginering as well as a wide sales experience.

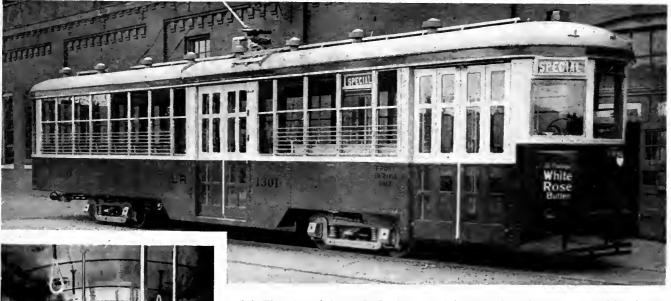
ADVERTISING LITERATURE

TORCHWELD EQUIPMENT COMPANY, Chicago, Ill., has issued a new Catalog No. 28 descriptive of its welding and cutting equipment. The pamphlet is entitled "Standard of Comparison."

ENGBERG'S ELECTRIC & MECHAN-ICAL WORKS, St. Joseph, Mich., has recently issued new bulletins Nos. 6023 and 6025 descriptive of its direct-current motors and motor generators.

Fusion Welding Corporation, Chicago, Ill., has issued a descriptive bulletin on its "Fuzon arc welders."

St. Louis builds its own—



Side Elevation of the 50 St. Louis units. They are of the front-entrance, side-exit type and are adaptable to one-man operation

equipped with

"Peacock" Brakes!

REG. U. S. PAT. OFF.

The first of 50 new cars being built by the St. Louis Public Service Co., was recently placed on public exhibition in St. Louis.

These fifty new units are all to be of the front-entrance, side-exit type, and, of course, are equipped with "Peacock" Brakes.

"Peacock" brakes are specified on nearly all modern cars because of the small platform space required; three times the braking capacity of other hand-brakes, low installation and maintenance cost and their simplicity of operation.

Shall we furnish you with performance facts and figures?

National Brake Company, Inc.

890 Ellicott Square

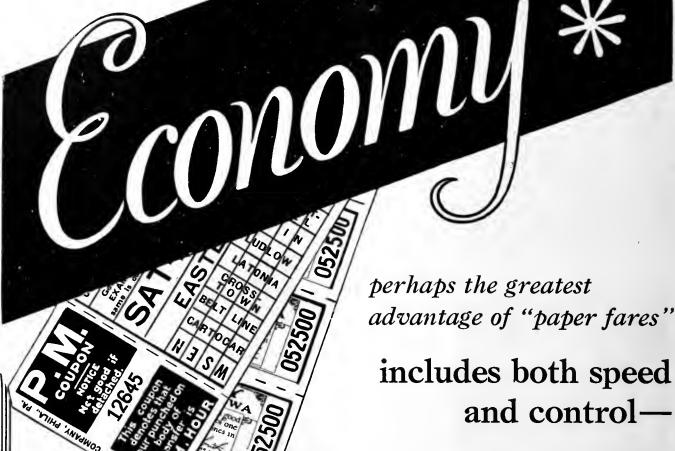
Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.



Rear view of interior of the 50 new units which are now being turned out from a shop of the Public Service Company of St. Louis

"Peacock" Improved Brake



the three "musts" in fare collecting

Speed
...
Control
...
Economy

Speed! Control! Economy!

There you have the three "Musts"—the three necessaries in efficient fare collecting.

Economy sums up the three. There can be no economy if speed is lacking—delays are costly. There can be no economy if fares slip through someone's fingers through lack of control.

Economy comes with a form and design difficult to counterfeit; a form whose significance is taken in with one rapid glance; a design which tells the collector three essential things—time—route—and destination. That is control—economy.

Economy means the ability to check accurately and quickly each fare collected, making it virtually impossible to misuse privileges. The elimination of change-making is time-economy.

The speed with which paper fares are verified and collected, and the resulting speed in moving traffic is a large factor in economy. Properly designed tickets and transfers give you these advantages. Globe has been "properly designing" them for over half a century.

Branch Factories:

New York Boston Los Angeles Globe TICKET COMPANY

Baltimore Albany
Cleveland
Cincinnati

District Offices:

112 North Twelfth Street PHILADELPHIA



Operating expenses reduced for the Atlanta Coach Company

A case where the excellent and YELLOW COACHES improved









speedier service rendered by public relationship and helped to an increased street railway fare

HE Georgia Power Company were faced with the problem of securing an increased fare on their street railway lines.

Back of their application was the determination to give the people of Atlanta the finest possible transportation service—a service so exceptionally high in character that both public good-will and the Commission would respond.

This determination to better their service extended through every branch of transportation under their control. Thus, although the coach fare of their subsidiary, the Atlanta Coach Company, was already ten cents, public good-will was strengthened by servicing the bus routes with what the company considered, after careful consideration, to be the best motor coaches available.

Ten Type X 21-passenger Yellow Coaches were the choice—attractive, comfortable, luxurious, speedy and exceptionally mobile in traffic.

And, in the estimation of the company, these Yellow Coaches did just this: the improved type of transportation rendered improved public relationship and unquestionably prevented some opposition to the increased railway fare, which recently was granted.

But Yellow Coaches won another victory, expressed in actual dollars and cents savings over former equipment of greater passenger capacity.

With fewer Yellow Coaches a net saving of \$33,000 a year was effected, after deducting operating expenses, depreciation and taxes.

A saving made in the face of an increase in coach miles from 464,296 in 1926 to 471,472 in 1927.

The routes covered by Yellow Coaches serve the finest and most exclusive residential sections of Atlanta, mounting hills 700 to 800 feet in length with grades as high as 10 to 12 per cent. How they are performing at an operating cost of .1684 cents per coach mile (including depreciation and State Tax) is told on the page following.



- 1927 **-**

Operating Expenses:	June	July	August	Septembe	r October	Novembe	er Total
Plant and Equipment	\$1,021.93	886.64	1,148.02	1,279.23	1,062.21	1,080.82	6,478.85
Power	\$ 768.17	816.21	804.60	807.71	739.62	713.86	4,650.17
Transportation	\$2,570.73	2,502.41	2,542.12	2,229.30	2,327.75	2,151.55	14,323.86
General	\$1,661.64	1,702.46	1,746.02	1,686.74	1,777.52	1.877.84	10,454.22
Total Passengers	54,481	55,771	59,352	61,480	67,239	62,995	361,318
Coach Miles	35,094	37,475	37,752	34,383	35,679	33,785	214,168
Oper. Ex. per Coach Mile.	\$ 0.1716	0.1607	0.1653	0.1746	0.1656	0.1724	0.1684

OPERATING EXPENSE PER COACH MILE=.1684 cents

Standardization of fleets is the growing trend. influenced by the desire for economy in maintenance and operation, responsibility for performance centered in one source of supply and to cement good-will on the part of the riding public by giving them the motor coaches which they like and to which they are accustomed.

In this low cost of operation is ample room for reflection.





Goodyear-equipped motor coach of The Shore Line Motor Coach Company, Michigan City, Indiana

COMFORTABLE TRAVEL!

Bus design, luxurious equipment, and tires, too, all play an essential part in first-class travel by motor coach.

Pneumatic tire construction that provides the very utmost in bus activity and cushioning has been developed by Goodyear.

To cite one item of this construction—SUPER-TWIST—it is evident that this extra-elastic, extra-durable cord promotes a riding quality in Goodyear Tires that is not to be found in others.

Typical of their performance in bus operation the country over is the record of Goodyear Pneumatic Cord Tires in the service of The Shore Line Motor Coach Company, of Michigan City, Indiana.

The Shore Line operates 172 motor coaches between Chicago and Detroit, and other

Illinois, Indiana and Michigan centers.

Theinterurban runs are of considerable length, and there is much city running, a good deal of it in Chicago, South Chicago, Indiana Harbor, Whiting, Hammond, and other city streets where pavements are extremely rough and traffic is a continual stop-and-go proposition.

Eighty-five per cent of the Shore Line coaches are equipped with Goodyear Tires. In an average month, they carry more than 620,000 passengers and travel over 500,000 miles.

In this service, individual Goodyear Tires have stood up for such distances as 21,000, 23,000, 24,000, 29,000 and even 30,000 miles!

"We have had excellent results with Goodyear Tires," writes Mr. J. C. Johnson, General Manager, "and are perfectly satisfied with their riding quality, long wear and general utility."

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service



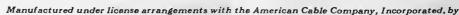


Think what it means to have Siemens Martin, High Strength and Extra High Strength strand that can be cut and handled like a single wire. No selvaging of the ends—no seizing—no kinking and

unstranding. Splicing is much simpler. Dead end fasteners are more easily attached.

What is more, Page Preformed Strand lasts longer in service. Locked-up torsional stresses of stranding are eliminated, loads are distributed so you get the combined strength of all the wires. Prove these facts

for yourself—your name and address brings a sample with instructions how to test it.



PAGE STEEL and WIRE COMPANY
BRIDGEPORT, CONNECTICUT

An Associate Company of the American Chain Company, Incorporated District Offices: Chicago New York Pittsburgh San Francisco





At Last Gear Auguiet Gear —and at a reasonable cost

The "Tool Steel" QUIET Gear, will not ring—runs without noise. A new method of filling dove-tailed grooves with lead completely and permanently deadens sound.

We spent years experimenting with substances to kill the ring in solid gears. Pads of various nature bolted in the web, double web gears filled with non-resonant materials, grease pads and others were tried but were discarded, either because noise silencing effect was not permanent or method too costly for general application.

The "Tool Steel" QUIET Gear is absolutely without ring, has nothing bolted to it, is not abnormal or peculiar in shape or construction and costs but a very little more than the Standard "Tool Steel" Gear.

Specify "Tool Steel"
QUIET Gears on your
next order



ankers ngineer

Ford, Bacon & Pavis

Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White **Engineering Corporation**

Engineers-Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

Design and Construction Examinations Reports Appraisals Industrial and Public Service Properties NEW YORK BOSTON CHICAGO

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys Better Service-Financial Reports Appraisals—Management

52 Venderbilt Ave.

New York

SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design

CHICAGO

Construction

Management

Examinations

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineers

alsals Reports Rates Service Investigation Studies on Financial and Physical Rehabilitation Reorganisation Operation Management

683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

J. ROWLAND BIBBINS

Engineer-2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City
Plans, Service, Routing, Valuation, Economic Studies EXPERIENCE IN 20 CITIES

C. B. BUCHANAN President

W. H. PRICE, JR.

JOHN F. LAYNO

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction Financial Reports, Traffic Surveys and Equipment Mointenance

BALTIMORE
1004 Citizens National
Bank Bidg.

Phone: Hanover: 2142

NEW YORK 49 Wall Street

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells APPRAISALS

Albert W. Hemphili

INVESTIGATIONS COVERING ion Management Operation Reorganization Construction

43 Cedar Street, New York City

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS 120 BROADWAY, NEW YORK

ENGINEERING CONSTRUCTION

FINANCING MANAGEMENT

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems

Valuations

Traffic Surveys

111 W. Washington Street, Chicago, Ill.

MCCLELLAN & JUNKERSFELD

ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations
Transportation Problems—Power Developments 68 Trinity Place, New York

Chicago

St. Louis

E. H. FAILE & CO.

Designers of

Garages— Service Buildings—Terminals

441 BEXINGTON AVE.

NEW YORK

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass—Differential Fares—Ride Selling

Holbrook Hall 5-W-3 160 Gramatan Ave., Mt. Vernon, N. Y.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BRANCH OFFICES

BRANCH OFFICES

BOSTON, 30 Federal Street
CHICAGO, Marquette Building
CLEVELAND, Guardian Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventsenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street



WORKS Bayonne, N. J. Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBUROH, FARMERS Deposit Bank Building
PORTLAND, ORE., Falling Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, ROYAL BANK BUILDING

THE P. EDWARD WISH SERVICE

50 Church St.

Street Railway Inspection DETECTIVES

31 State St

TRAFFIC CONSULTANT

Freight Rate, Tariff and Traffic Analyses;
Advisory Freight Traffic Assistance
on Special or Monthly Basis;
Preparation of Cases before Interestate Commerce
Commission and State Commissions.

HALSEY McGOVERN

Mills Bldg., 17th and Pa. Ave., Washington, D. C.

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



GOLD CAR HEATING & LIGHTING CO. 220 36th St., Brooklyn, N. Y.

ELECTRIC HEATERS WITH OPEN COIL OR THERMOSTAT CONTROL—VENTILATORS

WRITE FOR NEW CATALOGUE



STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bidg.
Pittsburgh, Pa.

CREOSOTED

Railroad Cross-ties; Switch-ties; Bridge Timbers; Construction Timbers; Mine Timbers, Lumber; Piling; Poles; Posts and other Farest Products

J.F. Prettyman & Sons
Wood Preserving Plant
Charleston. S. C.

NAUGLE POLES WESTERN'S NORTHERN GEDAR NAUGLE POLE & TIE CO, 59 E. MADISON ST. CHICAGO ILL. New York · Columbus · Kansas City · Spokane · Vancouver · Boston

H B LIFE GUARDS

PROVIDENCE FENDERS

Manufactured by

CONSOLIDATED CAR FENDER Co., PROVIDENCE, R. I.

General Sales Agents
WENDELL & MacDUFFIE CO., 110 E. 42nd St., N. Y. C.

CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetless—Light Weight Best for Service — Durability and Economy. Write Us.

Chillingworth Mfg. Co. Jarsey City, N. J.

BELL—CEDAR POLES

WESTERN

BUTT TREATING
ALL GRADES

TIES

BELL LUMBER CO., Minneapolis, Minn.

Efficient Bus Heating

The N-L Venti-Duct Heater

THE NICHOLSLINTERN CO.

THE NICHOLS-LINTERN CO. 7960 Lorain Ave. Cleveland, Ohio

HASKELITE ROOFS

Haskelite Manufacturing Corporation, 133 West Washington Street, Chicago

PLYMETL SIDE PANELS



Main Office and Factory 3302-3320 Anable Ave., Long Island City, N. Y. DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave. Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile. Library Building.

Cleveland, Electrical Engineering & Mfg. Co., 320 Union Building. Baltimore, O. T. Hall, Sales Engineer, 432 North Calvert St.

Revere, Mass., J. F. Drummey, 75 Pleasant Street.

Los Angeles, Electrical Engineering Sales Co., 502 Delta Building. San Francisco, Electrical Engineering Sales Co., 222 Underwood Bldg. Toronto, Can., Railway & Power Engineering Corp., Ltd. 133
Eastern Ave.

Montreal, Can., Railway & Power Engineering Corp., Ltd., 68-70 St. Antoine St.

Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.

Griffin Wheel Company

410 North Michigan Ave. Chicago, Ill.

Griffin Wheels

with Chilled Rims and Chilled Back of Flanges For Street and Interurban Railways

FOUNDRIES:

Chicago Detroit Denver Cleveland

Boston Kansas City Council Bluffs Salt Lake City

St. Paul Los Angeles Tacoma Cincinnati



COLUMBIA

Railway Supplies and Equipment

Machine and Sheet Metal Work

Forgings Special Machinery and Patterns

Grey Iron and Brass Castings

Armature and Field Coils.

The Columbia Machine Works and M. I. Co.

265 Chestnut St., corner Atlantic Ave., Brooklyn, New York

SEARCHLIGHT SECTION

POSITIONS VACANT

ASSISTANT engineer, young with one to two years' experience in railway work; civil engineer preferred; location, Eastern Virginia; opportunity for advancement; give full details and experience in first letter. P-90, Electric Railway Journai, Tenth Ave. at 36th St., New York.

LARGE Eastern property has opening for young experienced schedule maker. In first fetter give full details, references, experience, and salary expected. P-86, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

POSITIONS WANTED

SUPERINTENDENT transportation; available in near future; qualified by wide experience; a proven successfui record, city and interurban railways and coordination rail and bus service; recognized ability in dealing successfuily with labor and public and all transportation problems; qualified by experience and ability to successfully fill position of superintendent or assistant manager; correspondence invited; high grade references. PW-82, Electric Railway Journai, 1600 Arch St., Philiadelphia, Pa. Arch St., Philadelphia, Pa.

SUPERINTENDENT of equipment, M. M. of long experience, desires to make change. PW-89, Electric Railway Journal, Tenth Ave. at 36th St., New York.

WOULD like to correspond with any company needing a high-grade official in any capacity, in city or interurban rallways; can manage any or all departments in the cost efficient manner. PW-33, Electric Rallway Journal, Guardian Bidg., Cleveland, Ohio.

WANTED

Experienced Manager for Railway Utility

operating city and suburban lines with gross revenues of four million annually. Apply stating age, experience and salary expected to-

A. W. McLimont, Pres.

Winnipeg Electric Co., Winnipeg, Manitoba, Can.

POSITIONS WANTED

DISTRIBUTION engineer in charge of all outside electrical equipment, poles and fixtures, track bonding, overhead and underground cables and trolley lines, signals and switches; experienced and successful; single; will consider any part of country or foreign countries; excellent references. PW-85, Electric Rallway Journal, 1600 Arch St., Philadelphia, Pa.

WANTED

TO BUY FOR CASH 15 Steel Interurban Cars

to be used in high speed service, equipped with saloon, smoking and baggage accommodation. Length about 50 feet, weight not to exceed 55,000 lbs. Group must be similar in design and dimensions, must be in good physical condition. Send full particulars regarding inspection and price to:

W-87, Electric Railway Journal Tenth Ave. at 36th St., New York City

HORSE CAR WANTED

A box horse car, preferably; might be interested in an open type horse car. If you have either type for sale, kindly advise as to price and where same may be inspected.

W-91, Electric Railway Journal Tenth Ave. at 36th St., New York City

BARGAINS IN CARS!

See our advertisement in the January 28th and February 4th issues for offerings of modern cars at unusually low prices—or write us for particulars!

G. T. ABEL

Used Railway Equipment
393 7th Ave., New York City
Telephone Longacre 7372

FOR SALE

15 BIRNEY SAFETY CARS Brill Built

West, 508 or G. E. 264 Motors Complete—Low Price—Fine Condition Cars Complete ELECTRIC EQUIPMENT CO. Commonwealth Bldg., Philadelphia, Pa.

Millions of Profit

A unique invention will be sold for North and South America by a German electro-technical con-

The article has many possibilities for application and can be manufactured very easily. Since it has exceptional merit and a great future we can only consider serious and quick acting applicants.

Offers under "Germany 555"

M. 88, Electric Railway Journal Tenth Ave. at 36th St., New York City

Car Wheel Lathe

1-Niles, used, in good condition. 42-in., 10-ft. 5-in. x 7-ft. 4-in. width equipped with D.C. shunt wound motor No. 327400, type GQC15, Form A.V. 9, volts 550, ampere 30, hp. 20, speed 775/1550 r.p.m., complete with G.E. Controller No. 226762, type R-118-A. Lathe will handle wheels from 24-in, to 40-in. in dia., turning both wheels at same time with two separate tools.

Price \$500.00 f.o.b. Oshkosh, Wis.

Wisconsin Power and Light Company

900 Gay Bldg., Madlson, Wisconsin.

45 Parlor Car and Street Coaches Car Type

consisting of 21-25-29 passenger capacity for sale on account of the elimination of some lines and the rerouting of others. Yellows, A.C.F.'s, Fageols, Macks, Internationals, Reos and Dodges. Some operated less than a year and all well maintained.

For prices and terms, write or wire,

Shore Line Motor Coach Company

122 South Michigan Avenue, Chicago, Illinois

Send for Special Bulletin on light weight, all steel, single and double truck

CARS

prices-see our full page ad. in Jan. 14 issue Electric Railway Journal, half page Jan. 21 issue or quarter page Feb. 4 issue.

The Irving S. Van Loan Corp. 1819 Broadway, New York City Telephone: Columbus 4278

We buy entire Railways and Power Plants New York City

We sell Street Railway and Power equipment



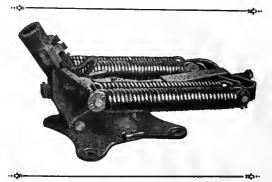


NACHOD & UNITED STATES SIGNAL CO., INC. LOUISVILLE,KY.

BLOCK SIGNALS FOR ELECTRIC RAILWAYS HIGHWAY CROSSING SIGNALS



Do You Think You Could Build a Nuttall Trolley?



You doubtless could if you knew what grade of metal to put in the foot, the swivel, the pole socket, etc.—if you knew where they had to be reinforced to withstand strains and where they had to be lightened to keep down weight; if you knew a reliable foundry that could furnish suitable castings; if you had \$60,000 worth of special machinery, tools, jigs, reamers, drills, etc., but even so, if you didn't have 35 years of experience and a crew of skilled mechanics you couldn't equal a Nuttall Trolley. So why should you think anyone else could?

Why should you buy just trolley poles, trolley harps, trolley wheels? If they cost less than Nuttall's it's poor economy anyhow, because they are worth less. And it is worth something *more* to get with your purchase the feeling of confidence inspired by a product you know is *right*.

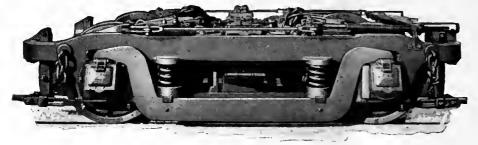
Buy genuine Nuttall Trolley parts, poles, wheels, harps, from Nuttall.

R.D.NUTTALL COMPANY PITTSBURGH PENNSYLVANIA



All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives for the Nuttall Electric Railway Products. Lyman Tube & Supply Co., Montreal and Torouto, Canada

Designed for High Speed Interurban Service



Commonwealth Devices are standard on many Railroad Cars and Locomotives.

Pedestals cast integral are machined and have renewable hardened steel liners applied.

Frame with cross and end transome combined in one strong casting.

Commonwealth construction eliminates truck repairs and maintenance.

COMMONWEALTH Motor Truck

Commonwealth Motor and Trailer Trucks are designed by men who have studied car requirements and who are capable of developing the most serviceable type of truck requiring the least maintenance. Investigate and see why.

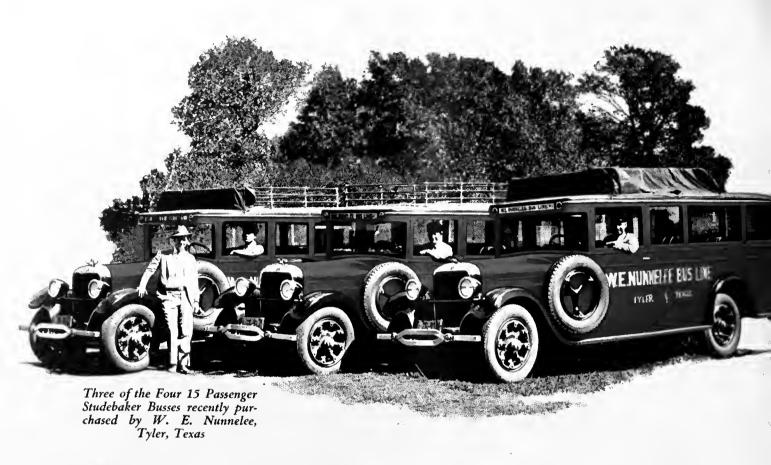
COMMONWEALTH STEEL COMPANY

GRANITE CITY, ILL.

satisfied owner buys the same product over and over again

STUDEBAKER
BUS OWNERS

TEXAS OPERATOR



MANY bus operators throughout the United States have found by experience that Studebaker busses are lower in after-cost as well as first cost.

The case of W. E. Nunnelee of Tyler, Texas, who recently bought his 35th Studebaker offers substantial proof that Studebaker busses supply the key to successful bus operation. Mr. Nunnelee who operates six lines out of Tyler, is now using Studebaker equipment exclusively.

Commenting on his latest purchase, Mr. Nunnelee says, "I take a great deal of pride in giving you the cost figures, covering about four months' operation of my four new 15-passenger Studebakers which are mounted on the "76" Special chassis. This new equipment is thoroughly satisfactory from

the standpoint of operation and dependability. Their attractive appearance, easy riding qualities and road performance are all that could be desired. I now have no busses of any make besides Studebakers. The success I have achieved is due to the equipment and careful management.

"These busses average 215 miles per day at a cost of \$.09084 per bus mile.

"On gas these four busses average 9.1 miles

per gallon. Fixed charges listed at left include all costs and all items of overhead not listed otherwise.

"I consider this operating economy the direct result of efficient management and excellence of rolling stock which exactly fits the job."

Nunnelee's Itemized Operating Costs

Gas .					\$.01754
Oil .					.0037
Drive	r.				.02075
Tires					.008
Greas	ing				.00092
Maint	tena	nce			.0061
Fixed	Ch	arges	3.		.03403
Total	Cos	st Pe	r M	ile	\$.09084

The New Studebaker BUS

BUYS 35th STUDEBAKER

Because experience proves Studebaker Busses cost less and produce more

first cost

operating cost

maintenance

depreciation

Owners of Studebaker busses make more money because this equipment costs less to buy and less to operate. The initial cost of Studebaker busses is lower than any other bus built of comparable capacity and power. According to the ratings of the Society

of Automotive Engineers, Studebaker is the most powerful bus chassis of its size and weight in the world. The operating cost is also lower and the maintenance cost is less as proved in the case of the Nunnelee Bus Line (see opposite

page) and by the experience of many other Studebaker bus operators.

Notably low depreciation is also read in a recent report from Nunnelee, stating his Studebaker busses cover 250,000 miles before they are retired from service. This is further evidence of the rugged strength, high quality materials, and excellent workmanship.

All of these are advantages to the owner which enable him to oper-

ate at a lower cost per bus mile. And Studebaker busses contribute further advantages by providing pleasing appearance, roomy interiors, wide vision, and deep, restful seats, all of which register an appeal with bus riders and

make for "repeat" business. These fundamental features of Stude-baker busses provide the solid foundation upon which a successful bus business is built.

i bus business is built.

In a recent report Studebaker Bus Models and Prices

"75" Heavy Duty Model—184" wheelbase, dual rear wheels chassis only	
21-Pass. Street Car Bus ("75" model chassis)	
"76" Special-184" wheelbase dual or single rear wheels (chassis	
only) ; y,,,,,,, .	2775
19-Pass. Cross-Seat Sedan on "76" special chassis	5275
20-Pass. Parlor Car De Luxe on "76" special chassis	6395
22-Pass. Observation Parlor Car on "76" special chassis	6395
"75" Junior Model—158" wheelbase (chassis only)	2410
Single or Dual Rear Wheels	
15-Pass. Cross-Seat Sedan ("75" Jr. Chassis)	4520
All prices f. o. b. factory. Purchase can be arranged on Studeba	ker's

CHASSIS

Mail	This	Coupon	for	further
		Particula	rs	

THE STUDEBAKER CORPORATION OF AMERICA Dept. B South Bend, Ind.
Please send me complete information on Studebaker Busses without obligation.
We havebusses at present. Check below the Studebaker Bus about which you desire information.
Chassis modelType: SedanParlor Car
Street Car Type
Name
Address



Comfort and Safety for Passengers Means Greater Profits for the Operator

Public demand for utmost comfort, and speed with safety, is fully met in the New Studebaker Observation Parlor Car for 22 passengers—the Seminole.

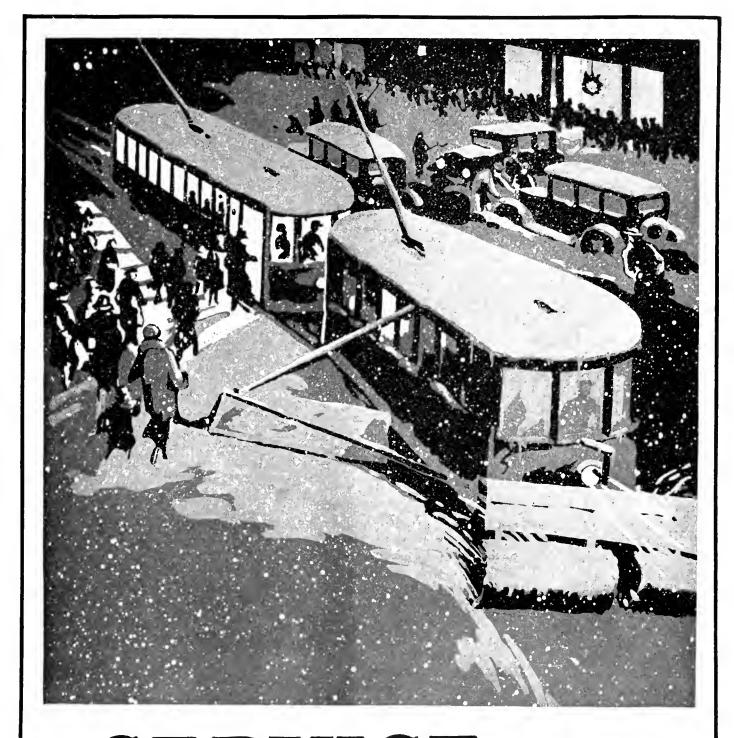
Its long low lines and clean cut design immediately register beauty to the eye. At the rear, ornamental grille work and overhanging top suggest the conventional Pullman. The interior leaves nothing to be desired in providing superlative comfort. Deep lounging seats of soft leather, air cushioned; wide aisles; unobstructed vision; adequate ventilation and heating; plus wonderfully quiet operation insures repeat business from all who ride in the luxurious Seminole.

Speed With Safety

Ruggedness of body and chassis affords safety to passengers and low maintenance to the operator. Center of gravity is particularly low and when traveling at permitted speeds there is no evidence of side sway. Notably easy steering and amplified-action four-wheel brakes give the driver positive control. The most timid rider has the same sense of safety he would have in his own car.

More Power—More Speed

Under the "Seminole" body is the Studebaker "76" Special chassis of 184-inch wheelbase. Recent refinements and changes to permit more speed have been made. The frame is the same heavy pressed steel unit with 9 cross-members that is used in the "75" heavy duty chassis. In this as in all Studebaker bus chassis the power plant is the famous Studebaker 6-cylinder engine which develops over 90 horse-power at 2600 R.P.M. A specially designed three speed transmission and rear axle with the more powerful motor, and with 800 pounds less weight to carry, give this bus the speed to command any road or traffic condition, plus greater economy of operation. These are prime essentials which make the "Seminole" a profit builder for the operator.



SERVICE.. yesterday-today-tomorrow

Barron G. Collier Inc.

Candler Bldg.

New York

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue This index is published as a convenience to the reader. Every care is taken to make it accurate, but Electric Railway Journal assumes no responsibility for errors or omissions.

Advertising, Street Car Collier, Inc., Barron G. Air Brakes General Electric Co. Westinghouse Traction Westinghouse Brake Co.

Anchors, Gny
Elec, Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armacuce Shoo Tools Columbia Machine Works Elec. Service Supplies Co. Antomatic Return Switch

Stands Ramapo Ajax Corp. Automatic Safety Switch Stande Bamapo Ajax Corp.

Axles

Bemis Car Truck Co.

Bethlehem Steel Co.

Brill Co., The J. G.

Carnegie Steel Co. Clochnati Car Co. Westinghouse E. & M. Co. Babbitting Devices Columbia Machine Works

Babbit Metal National Bearing Metala Corp.

Badges and Buttoos Elec. Service Supplies Co. Batterles, Dry Nichole-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
National Bearing Metal Westinghouse E. & M. Co.

Bearings, Center and Roller Side Cincinnsti Car Co. Columbia Machine Works Stucki Co., A.

Bearings, Roller Timken Roller Bearing Co.

Bells and Buzzers
Consolidated Car Heating
Co.

Bells and Googe Brill Co., The J. G. Cincinnati Car Co. Columbia Machine Works Elec. Service Supplies Co.

Benders, Rali Railway Trackwork Co. Body Material, Haskelite Haskelite Mfg. Corp.

Bodies, Bus Brill Co., The J. G. Graham Bros.

Bollers Babcock & Wilcox Co.

Bond Testers American Steel & Wire Co. Electric Service Supplies Co.

Bonding Apparatus
American Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Rallway Trackwork Co.
Una Welding & Bonding Co.

Bonde, Rail
American Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Reackets and Cress Arms
(See also Poles, Ties,
Posts, etc.)
Bates Expanded Steel
Truse Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brase Co.

Brake Adjusters
Brill Co., The J.
Cincinnati Car Co

ational Ry. Appliance Co. Veetinghouse Tr. Br. Co.

Brake Shoes
American Brake Shoe &
Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Brake Testers
National Ry. Appliance Co.

National Ry. Appliance Co.
Brakes, Brake Systems and
Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Clincinnati Car Co.
Columbia Machine Works
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.
Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon General Electric Co. Morganite Brush Co., Inc. Westinghouse E. & M. Co. Brushes, Graphite Morganite Brush Co., Inc.

Brushholders Columbia Machine Works Columbia Machine General Electric Co.

Bulkheads Haskelite Mfg. Corp. Bunkers, Coal American Bridge Co.

Buses
General Electric Co.
Studebaker Corp.
Yellow Truck & Coach Co.

Bus Lighting
National Ry. Appliance Co.

Bushings, Case Hardened and Manganese Bemis Car Truck Co. Brill Co., The J. G. Cincinnati Car Co. Columbia Machine Works Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Vernish General Electric Co. Irvingtoo Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co. Car Panel Safety Switches Consolidated Car Hesting

Co. Westinghouse E. & M. Co. Car Steps, Safety Cincinnati Car Co.

Car Wheels, Rolled Steel Bethlehem Steel Co.

Cars. Dump Brill Co.. The J. G. Differential Steel Car Co.

Cars, Gas-Electric Brill Co., The J. G. General Electric Co. Westinghouse E. & M. Co.

Cars. Gas. Raii Brill Co.. The J. G.

Cars. Passenger, Freight, Express. etc.
American Car Co.
Brill Co. The J. G.
Clincinnati Car Co.
Kuhlman Car Co.. G. C.
Wason Mig. Co.

Cars. Second Hand Electric Equipment Co.

Cars. Self-Propelled Brili Co., The J. G.

Castings, Brass Composition or Copper Cincinnati Car Co. Columbia Machine Works National Bearing Metals Corp.

Castings, Gray Iron and Steel Steel
American Brake Shoe &
Foundry Co.
American Steel Foundriee
American Bridge Co.
Bemis Car Truck Co.
Columbia Machine Works
Staudard Steel Works Castings, Malleable & Brass American Brake Shoe & Foundry Co. Bemis Car Truck Co. Columbia Machine Works

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas N.
Catenary Construction
Archbold-Brady Co.

Ceiling Car Haskelite Mfg. Corp. Ceilings Plywood Panels Haskelite Mfg. Corp.

Change Carriers Box Cleveland Fare Box Co. Electric Service Supplies Co.

Change Trays Cincinnati Car Co.

Circult-Breakers General Electric Co. Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables Columbia Machine Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. Ohio Brass Co. Westinghouse E. & M. Co.

Cleaners Oakite Products, Inc.

Cleaners and Scrapers Track (See also Snew-Flows, Sweepers and Brooms) Brill Co., The J. G. Cincinnati Car Co. Long Mfg. Co.

Coll Banding and Wlading Machines Columbia Machine Works Elec. Service Supplies Co Westinghouss E. & M. Co

Colls. Armature and Field Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Colls, Choke and Kicking Elec. Service Supplies Co. Elec. Service Supplies Co. General Electric Co. Westinghouse E & M. Co. Coin Changers
Johnson Fare Box Co.

Coln Counting Machines Cleveland Fare Box Co. Johnson Fare Box Co.

Coln Sorting Machines Cleveland Fare Box Co. Johnson Fare Box Co.

Coln Wrappers Cleveland Fare Box Co.

Commutator Slotters Columbia Machine Works

Elec. Service Supplies Co. Westinghouse E. & M. Co. Wood Co.. Chas. N.

Commutators or Parts Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Compressors, Air General Electric Co. Westinghouse Tr. Br. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Condensor Papers Irvington Varnish & Ins. Co.

Connectors, Solderless Westinghouse E. & M. Co.

Connectors, Trailer Car Columbia Machine Works Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts Columbia Machine Works General Electric Co. Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
American Brass Co
American Steel & Wire Co
Anaconda Copper Mining
Co Page Steel & Wire Co.

Copper Wire Instruments,
Measuring, Testiog and
Recording
American Brass Co.
Anaconda Copper Mining Co.

Cord. Bell. Trolley, Registor American Steel & Wire Co. Brill Co., The J. G. Elec. Service Supplies Co. Page Steel & Wire Co. Roebling's Sons Co., John A. Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Sameon Cordage Works
Wood Co., Chas. N.

Couplers, Car American Steel Foundries Brill Co., The J. G. Cincinnati Car Co. Ohio Brass Co. Westinghouse Traction Brake Co.

Cowl Ventilators
Nichols-Lintern Co. Cranes, Hoists & Lifte Electric Service Supplies Co. Cross Arms (See Brackets)

Crossing Foundations
International Steel Tia Co.

Crossings Ramano Ajax Corp. Wm. Wharton, Jr. & Co.

Crossings, Frogs & Switches Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Crossings, Manganese Bethlehem Steel Co. Ramapo Ajax Corp. Wm. Wharton. Jr. & Co.

Crossings, Track (See Track Special Work)

Crossings, Trolley General Electric Co. Ohlo Brass Co. Westinghouse E. & M. Co.

Curtains & Curtain Fixtures Brill Co., The J. G.

Cotting Apparatus
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Electrical &
Mig. Co.

Dealer's Machinery & Second Hand Equipment G. T. Abel Electric Equipment Co. Irving S. Van Loan Corp. Salzberg Co., Inc., H. E.

Deralling Devices (See also Track Work)

Deralling Switches
Ramapo Ajax Corp.

Destination Signs Columbia Machine Works Elec. Service Supplies Co.

Detective Service Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.
Safety Car Devices Co.

Doors & Door Fixtures Brill Co. The J. G. Cinclanati Car Co. Hale-Kilburn Co.

Doors. Folding Vestibule Netional Pneumatic Co. Safety Car Devices Co.

Drills, Track American Steel & Wirs Co. Electric Service Supplies Co. Ohlo Brass Co.

Dryers, Sand Electric Service Supplies Co. onto Brass Co. Westinghouse E. & M. Co.

Eard Columbia Machine Works Electric Service Supplies Co. General Electric Co. Chio Brase Co. Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co. Electrical Wires and Cables Amer. Electrical Works. American Steel & Wire Co. John A. Roebling's Sous Co.

Electrodes, Carbon Railway Trackwork Co. Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Uns Welding & Bonding Co. Engineers, Consulting, Contracting and Operating
Beeler, John A.
Bibbine, J. Rowland
Day & Zimmermann, Inc.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holet Engelbards W.

Hemphill & Wella
Holet, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
McGovern, Halsey
Richey, Albert S,
Sanderson & Forter
Stevene & Wood
Stone & Webster Co.
White For Com The I

White Eng. Corp., The J. C. Engines, Gas, Oil or Steam Weetinghouse E. & M. Co. Exterior Side Panels Haskelite Mfg. Corp.

Fare Boxes Cleveland Fare Box Co. Johnson Fare Box Co. Perey Mfg. Co.

Fare Registers Fare Registers
Electric Service Supplies Co.
Johnson Fare Box Co.
Fencos, Woven Wire & Fence
Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Star Brass Works
Wood Co., Chas. N.

Fibre and Fibre Tubing Westinghouse E. & M. Co. Field Colle (See Colls)

Floodlighte
Electric Service Supplies Co.
General Electric Co. Floor, Sub Haskelite Mfg. Corp.

Fluora Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works

Frogs & Crossings, Tee Rail Bethlehem Steel Co. Lorain Steel Co. Ramapo Ajax Corp. Wm. Wharton, Jr. & Co.

Frogs. Track (See Track Work)

Frogs. Trolley
Electric Service Supplies Co.
General Electric Co.
Ohlo Brass Co.
Westinghouse E. & M. Co.

Fuses and Fuse Boxes Columbia Machine Works Consolidated Car Heating Co. General Electric Co. Westinghouse E. & M. Co.

Gas Electric Drive for Buses General Electric Co.

Gaskets Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car Brill Co., The J. G. Cincinnstl Car Co. (Continued on page 42)



JOHNSON FARE COLLECTING **SYSTEMS**

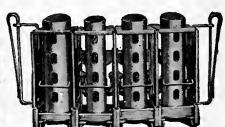


Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 11 to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.





Johnson Fare Box Co.

4619 Rovenswood Ave., Chicogo, Ill.

SPECIAL TRACKWORK of the famous TISCO MANGANESE STEEL

WM. WHARTON JR. & CO., INC. EASTON, PA.

Chicago El Paso Montreal New York Philadelphia Pittsburgh San Francisco Scranton

B. A. HEGEMAN, Jr. President F. T. SARGENT, Secretary

H. A. HEGEMAN, First Vice-Pres. and Treas J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co. Graybar Bullding, 420 Lexington Ave., New York

BRANCH OFFICES

Munecy Bldg., Washington, D. C. 100 Boyleton St., Boston, Mass, Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steal Gears and Pinlons
Angio-American Varnish Co.,
Varnishes, Enamels, etc.
National Hand Holds
Genesco Paint Olis
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Plows
Feasible Drop Brake Staffs
Ft. Pitt Spring & Mig. Co.,
Springs. Springs

Fiaxlinum Insulation Economy Electric Devices Co. Power Saving and Inspection Meters Meters
National Safety Devices Company's Whistle Blowers,
Gong Ringers and Brake
Hangers
Godward Gas Generators
Cowdry Automotive Brake
Testing Machine

Clean them on schedule!

HAT is the way to keep your cars always looking their best-clean and inviting to the public—attracting greater revenue.

Then, too, there is another advantage scheduled cleaning of cars, when it is done with Oakite, saves repainting. Every trace of dirt, grease and grime is removed leaving surfaces free from streaks and smears. Oakite does not discolor or otherwise harm paint or varnish. And the same solution used for cleaning the outside of your cars can be used equally as well on interior woodwork and fixtures.

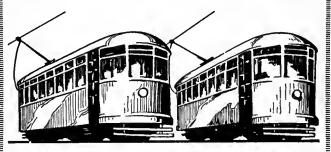
Our Service Man will tell you more about this better way to clean. Write us for details.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U.S. and Canada

Oakite is manufactured only by OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

Industrial Cleaning Materials and Methods

M-J Armature Babbitt





No less than twenty-five different grades of Babbitt have been successfully perfected in the More-Jones line, designed for various services and at varying prices. "Armature" for electric railways is the recognized standard. Let us quote you.

National Bearing Metals Corporation

New York, N. Y Jersoy City, N. J. St. Louis, Mo. Portsmouth, Va.

Pittsburgh, Pa. Meadville, Pa.

"MORE-JONES QUALITY PRODUCTS"

Gear Blanks
Brill Co. The J. G.
Standard Steel Works

Gear Cases Chillingworth Mfg. Co. Columbia Machine Works Electric Service Supplies Co. Westinghouss E. & M. Co.

Gears and Plaions
Bemia Car Truck Co.
Columbia Machine Works Columbia Machine Works Electric Service Supplies Co. General Electric Co. Nat'l Ry. Appliance Co. R. D. Nuttall Co. Tool Steel Gear & PinionCo.

Generators
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Stesl Co.
Lorsin Steel Co. Gongs (See Belle and Gongs)

Grinders & Grinding Supplies Metal & Thermit Corp.

Grinders, Portable Railway Trackwork Co. Grinders, Portable Electric Railway Trackwork Co.

Grinding Bricks and Wheels Railway Trackwork Co.

Ground Wires Page Steel & Wire Co.

Guard Bail Clamps
Lorain Steel Co.
Ramapo Ajax Corp.

Gnard Ralls, Tes Rall & Manganese Ramano Ajax Corp. Wm. Wharton, Jr. & Co.

Gnards, Trolley
Elec. Service Supplies Co.
Ohlo Brass Co.

flarps. Trolley
Columbia Machine Works
Elec. Service Supplies Co.
National Bearing Metals

Corp.
R. D. Nuttall Co.
Chio Brass Co.
Star Brase Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining Columbia Machine Works Haskelits Mfg. Corp.

Heaters, Bns Nichols-Lintern Co.

Heaters, Car (Electric) Consolidated Car Heating Co. Gold Car Heat. & Lig. Co. Railway Utility Co. Smith Heater Co., Peter

Heaters, Car, Hot Air and Water Smith Heater Co., Pater

Heaters, Car Stove Smith Heater Co., Peter

Helmets, Welding Railway Trackwork Co. Una Welding & Bonding Co.

Holsts & Lifts Columbia Machine Works

Hose, Bridges Chio Brass Co.

Hose, Pneumatic Westinghouse Traction Brake Co.

ostruments, Measuring,
Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Westinghouse E. & M. Co. lostruments.

Insulating Cloth, Paper and Tape General Electric Co. Irvington Varnish & Inc.

Co. Ckonite Co. Okonite-Callender Cable Co. Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins.

Insulating Varnishes
Irvington Varnish & Ins.
Co.

Insulation (See also Painte)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Irvington Varnish & Ins.
Co.

Okonite Co. Okonite-Callender Cable Co. Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins.

Irvington Varnish & Ins.
Co.
Insulator Pins
Else. Service Supplies Co.
Ohlo Brass Co.
Insulators (See also Line
Materlais)
Elee. Ry. Equipment Co.
Else. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins.
Co. Co. Chio Brass Co.

Ghio Brass Co.
Westinghouse E. & M. Co.
Interior Sids Linings
Haskelite Mfg. Corp.
Jacks (See also Craces,
Holsts and Lifts)
Columbia Machine Worke
Elec. Service Supplies Co.
Jointe Poll

Jointe, Rall
(See Rall Joints) Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Lamp Guards and Fixtures
Elec. Service Supplies Co.
Westinghouse E. & M. Co. Lamps, Arc & Incandescent (See also Headlights) General Electric Co. Westinghouse E. & M. Co.

Lamps, Signal and Marker Elec. Service Supplies Co. Nichols-Lintern Co.

Lanterns, Classification Nichols-Lintern Co. Nichols-Lintern Co. Letter Banrds Cincinnati Car Co. Haskelite Mfg. Corp. Lighting Flatures, Interior Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Westinghouse E. & M. Co.
Line Material (See also
Brackeis, Insulators,
Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Electric Ry. Equipment Co.
General Electric Co.
National Bearing Metals
Corp.

Corp.
Ohio Brass Co.
Westinghouse E. & M. Co. Locking Spring Boxes
Lorsin Steel Co.
Wm. Wharton, Jr. & Co.

Locomotives, Electris Cincinnati Car Co. General Electric Co. St. Louis Car Co. Westinghouse E. & M. Co. Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oll and Grease Universal Lubricating Co. Manganese Parts Bemis Car Truck Co.

Manganese Sieel Guard Ralls Ramapo Ajax Corp. Wm. Wharton Jr. & Co.

Manganese Steel Casilngs Lorain Steel Co. Manganese Steel, Special Track Wark Bethlehem Steel Co. Wm. Wharton, Jr. & Co.

Manganese Steel Switches,
Frogs and Crossings
Betblehem Steel Co.
Lorain Steel Co.
Ramsno Ajax Corp.
Wm. Wharton, Jr. & Co.

Mirrors, Inside & Ontside Cincinneti Car Co. Motor Buses (See Buses) Motors, Electric General Electric Co. Westinghouss E. & M. Co.

Motor, Generators & Controls for Electric Boses General Electric Co.

Motorman's Sents
Erill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Wood Co., Chas. N.

Nuts and Bolts
Bemis Car Truck Co.
Cincinnati Car Co.

Omalbases (See Buses) Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Traction
Brake Co.

Paints and Varnishes (Insulating) Elec. Service Supplies Co. Irvington Varnish & Ins. Co.

Psints & Varnishes, Railway National Ry. Appliance Co. Panels, Ontside, Inside Haskelits Mfg. Corp.

Paving Material American Brake Shoe & Foundry Co.

Pickup, Trolley Wire Elec. Service Supplies Co. Chio Brase Co.

Pinion Pullers
Elec. Service Supplies Co.
Wood Co., Chas. N.

Plnions (See Gears) Pins, Case Hardened, Wood and Iron Chio Brass Co. Westinghouss Traction Brake Co.

Pine Fittings Standard Steel Works Westinghouse Tr. Brake Co. Planers (See Machine Tools)

Plates for Tee Rail Switches Ramapo Ajax Corp.

Pliers, Rubber Insulated Elec. Service Supplies Co.

Plywood Roofs, Headlinings, Floars, Interior Panels, Bulkheads, Truss Planks Haskelits Mfg. Corp.

Pole Line Hardware Bethlehem Steel Co. Elec. Service Supplies Co. General Electric Co. Chio Brasa Co.

Poles. Metal Street
Bates Expanded Steel
Truss Co.
Elec. Ry. Equipment Co.

Poles, Ties, Posts, Plling & Lumber
Bell Lumber Co.
Naurie Pole & Tie Co.
J. F. Prettyman & Son

Poles and Ties, Treated Bell Lumber Co. J. F. Prettymen & Son

Poles, Trolley
Elec. Service Supplies Co.
R. D. Nuttall Co.

Paies, Tubular Steel Elec. Ry. Equipment Co. Elec. Service Supplies Co.

Portable Grinders Railway Trackwork Co.

Potheada Okonite Co. Gkonite-Callender Cable Co., Inc.

Power Saving Devices National Ry. Appliance Co. Pressings, Special Steel Cincinnsti Car Co.

Pressure Regulators General Electric Co. Westinghouse E. & M. Co. Westinghouse Traction Brake Co.

Punches. Ticket Wood Co., Chas. N.

Rail Braces and Fastenings Ramapo Ajax Corp.

Rail Grinders (Ses Grinders) Rail Joints Rail Joint Co.

Rail Joints, Welded Lorain Steel Co. Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Rallway Safety Switches Consolidated Car Heating Co. Westinghouse E. & M. Co.

Rattan

Brill Co., The J. G.

Elec. Service Supplies Co.

Hale-Kilburn Co.

Brill Co., The J. G. Cincinnati Car Co. Elec. Service Supplies Co. Chmer Fare Register Co.

Reinforcement, Concrete American Steel & Wire Co. Bethlehem Steel Co. Carnegie Steel Co.

Repair Shap Appliances (See also Coll Banding and Winding Machines) Elec. Service Supplies Co. Repair Work (See also

Westinghouse E. & M. Co. Steplacers, Car Cincinnati Car Co. Elec. Service Supplies Co. Resistances
Consolidated Car Heating
Co.

General Electric Co. Resistance, Wire and Tube Westinghouse E. & M. Co. Retrievers, Trolley (See Catchers and Retrievers Trolley)

Rheostats
General Electric Co.
Westinghouss E. & M. Co. Roofing, Car Haskelite Mfg, Corp.

Roofs, Car and Bus Haskelite Mfg. Corp. Safety Control Devices Safety Car Devices Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ghlo Brass Co.

Sash Fixtures, Car Brill Co., The J. C Cincinnati Car Co.

Sash, Metal Car Window Hals-Kilburn Co.

Scrapers, Track (See Clean-ers and Scrapers, Track)

Screw Drivers, Rubber Insulated Elec. Service Supplies Co. Seating Materials
Brill Co., The J. G.
Haskelite Mfg. Corp.

Seats, Bns Brill Co., The J. G. Hale-Kliburn Co.

Seats, Car (See also Battan)
Brill Co., The J. G.
Cincinnsit Car Co.
Hale-Kilburn Co.

Second Hand Equipment Abel, G. T.
Electric Equipment Co.
Irving S. Van Loan Corp.
Salzberg, Inc., H. E.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Shovels
Brill Co., The J. G. Shovels, Power Brill Co., The J. G.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting
Consolidated Car Heating
Co.
Elec. Service Supplies Co.
National Pneumatic Co.

Signals, Indicating Nichols-Lintern Co.

Signal Systems, Block Elec. Service Supplies Co. Nachod and United States Electric Signal Co. Wood Co., Chas. N.

Signal Systems, Highway ignal Systems, Crossing Nachod and United States. Electric Signal Co. Wood Co., Chas. N.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cuttars Cincinnati Car Co. Columbia Machins Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. National Bearing Metals Corp. R. D. Nuttall Co.

Smokestacks, Car Nichols-Lintern Co.

Snow Plows
National Ry. Appliance Co. Snow-Plows, Sweepers and

Brooms
Brill Co., The J. G.
Columbia Machine Works
Consolidated Car Fender Co.

Snow Sweeper, Rattan J. G. Brill Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorsin Steel Co.
Wm. Wharton, Jr. & Co.

Spikes
American Steel & Wire Co. Splicing Companida
Westinghouse E. & M. Co.
Splicing Sleeves (See Clamps
and Connectors)

Springs National Ry. Appliance Co. National Ry. Appliance Co. Springs, Car and Trnek American Spiral Spring Co. American Steel Foundries American Steel & Wire Co. Bemia Car Truck Co. Bemia Car Truck Co. Brill Co., The J. C. Cincinnati Car Co. Standard Steel Works

Sprinklers, Track and Road Brill Co., The J G. Steel and Steel Products American Steel & Wire Co.

Steps, Car Brill Co., The J. G. Cincinnati Car Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals Nichole-Lintern Co. Storage Ratterics (See Bat-terles, Storage)

Strain Insulatora
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co.. J. A.

(See Cars.

Street Cars (See Cars, Passenger, Freight, Express) Superheaters Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms) Switches General Electric Co.

Switch Stands and Fixtures Ramapo-Ajax Corp. Switches, Sciector Nichols-Lintern Co.

Switches and Switchboards Consolidated Car Heating Co. Elec. Service Supplies Co. Westinghouse E. & M. Co.

Switches, Tee Rail Ramano-Aiax Corp. Switches, Track (See Track Special Work

Tampers, Tle Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work Lorain Steel Co. Ramapo-Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Telephone & Telegraph Wire American Telephone & Tele-graph Co. American Steel & Wire Co. John A. Roeblings Sons Co.

Testing Instruments (See Instruments, Measuring, Testing, etc.)

Thermostate Censolidated Car Heating Consolidated Car Heating Cn. Gold Car Heating & Light-ing Co. Railway Utility Co. Smith Heater Co., Peter

Ticket Choppers and Destroyers Elec. Service Supplies Co

Tickets & Transfers Globe Ticket Co.

Ties and Tie Rods, Steel International Steel Tie Co. Ties, Wood Cross (See Poles. Ties, Posts, etc.)

Tires Goodyear Tire Co., The Tokens Johnson Fere Box Co.

Tongue Switches
Wm. Wharton, Jr. & Co.

(Continued on page 45)

"The Standard for Rubber Insulation"

INSULATED WIRES and CABLES

"Okonite," "Manson," and Dundee "A" "B" Tapes

Send for Handbook

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories, PASSAIC, N. J. PATERSON, N. J.

Offices: New York Chicago Pittsburgh St. Louis Birmingham San Francisco Los Angeles Seattle

Pettingell-Andrews Co., Boston, Mass. F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Phila., Pa.

Com. Rep.; Engineering Materials Limited, Montreal. Cubon Rep.; Victor G. Mendoza Co., Havana.



AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

CHICAGO, NEW YORK, BOSTON, CLEVELAND, WORCESTER, PHILADEL-PHIA, PITTSBURGH, BUFFALO, DETROIT, CINCINNATI, BALTIMORE, WILKES-BARRE, ST LOUIS, KANSAS CITY, ST. PAUL, OKLAHOMA CITY, BIRMINGHAM, MEMPHIS, DALLAS, ATLANTA, DENVER, SALT LAKE CITY EXPORT REPRESENTATIVE: U. S. STEEL PRODUCTS CO., NEW YORK PACIFIC COAST REPRESENTATIVE: U. S. STEEL PRODUCTS COMPANY, SAN FRANCISCO, LOS ANGELES, PORTLAND, SEATTLE.

TEH DICTURA CONTROL CO



Boyerized Parts:

Brake Pins
Brake Hangers
Brake Levers
Pedestal Glbs
Brake Fulerums
Turnbuckles
Center Bearings

Spring Post Bushings
Spring Posts
Bolster and Transom
Chaing Plates
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings

Bearings Bronze De McArthur Turnhuckles Can be purchased through the following representatives:

F. F. Rodler. 903 Monadnock Bldg., San Francisco, Cal.

W. F. McKenney, 54 First Street, Portland, Oregon.

J. H. Denton, 1328 Broadway, New York City, N. Y.

A. W. Arlin, 519 Delta Bidg., Los Angeles, Cal.

Bemis Car Truck Company Springfield, Mass.



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Chicago, 29-32 West Randolph Street, Cincinnati, Traction Bidg.: New York, 199 E. 42nd St.





Electrical Wires & Cables John A. Roebling's Sons Co. Trenton, N. J.



Rod, Wire and Cable Products

ANACONDA COPPER MINING COMPANY THE AMERICAN BRASS COMPANY General Offices - 25 Broadway, New York

NACONDA TROLLEY WIRE

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off. de of extra quality stock firmly braided and smoothly finished Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

RAIL JOINTS

21 (00 (2001 (2001 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011 (2011

The Rail Joint Company 165 Broadway, New York City

Better Quality Seats For Cars and Buses

Hale-Kilburn Co. 1800 Lehigh Ave., Philadelphia, Pa.

RAIL GRINDERS AND WELDERS

Railway Track-work Co., Philadelphia

Waterproofed Trolley Cord

The finest that science and skill can produce. For endurance, economy and positive satisfaction, use Silver Lake A.

SILVER LAKE COMPANY



Newtonville

Manufacturers of bell, trolley, signol and other cords,

The DIFFERENTIAL CAR



Standard on 60 Railways for

Track Maintenance
Track Construction
Ash Disposal
Coal Hauling
Concrete Materials
Waste Handling
Excavated Materials
Hauling
Cross Ties Hauling Cross Tles Snow Disposal

Use These Labor Savers

Differential Crane Car Clark Concrete Breaker Differential 3-way Auto Truck Body Differential Car Wheel Truck and Tractor

THE DIFFERENTIAL STEEL CAR CO., Findlay, O.

THE WORLD'S STANDARD

"IRVINGTON"

Varnished Silk. Varnished Cambric. Varnished Paper

Flexible Varnished Tubing Irv-O-Slot Insulation Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co. Irvington, N. J.

Sales Representatives:

Mitchell-Rand Mfg. Co., N. Y.
E. M. Wolcott, Rochester
I. W. Levine, Montreal
A. L. Gillies, Toronto
Consumers' Rubber Co., Cleveland



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment The Universal Lubricating Co. Cleveland, Ohio

Chicago Representatives: Jameson-Ross Company, Straus Bldg. de de la company de la comp



BOXES for BUSES

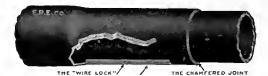
Let us tell you of this especially designed box for this class of service.

The Cleveland Fare Box Co. 4900 Lexington Ave., Cleveland, O. Canadian Cleveland Fare Box Co., Ltd.

Prestoa, Oatarlo

COUNTING And Sorting Machines CARRIERS Tokens

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Least Maintenance

Lightest Weight Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO. CINCINNATI, OHIO

New York City, 30 Church Street

Bethlehem Products for Electric Railways

Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Frogs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Base Plates; Rolled Steel Wheels and Porged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.



Car Heating and Ventilating

—are no longer operating problems. We can show you how to take care of both with one equipment. The Peler Smith Forced Ventilation Hot Air Heater will save, in addition, 40% to 60% of the cost of any other car heating and veotilating system. Write for details.

The Peter Smith Heater Company 6209 Hamilton Ave., Detroit, Mich.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc. 101 Perk Avenue, New York City



AILWAY

HEATERS REGULATORS **VENTILATORS**

ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but Electric Railway Journal assumes no responsibility for errors or omissions.

Page	Page	Page	Page
Abel, G. T. 33 American Brass Co., The 43 American Car Co., 46 & Third Cover American Electrical Works 43	Electric Equipment Co	McClellan & Junkersfeld 30 McGovern, Halsey 31 McLimont, A. W. 33 Metal & Thermit Corp 9	Sanderson & Porter 30 Searchlight Section 33 Shore Line Motor Coach Co 33 Silver Lake Co 43
American Steel & Wire Co. 43 American Steel & Foundries 4 American Telephone & Telegraph Co	Faile & Co., E. H	Morganite Brush Co., Inc 32 Nachod and U. S. Signal Co 33 National Bearing Metals Corp 41	Smith Heater Co., Peter
Anaconda Copper Mining Co 43 Babcock & Wilcox Co 31	General Electric Co., 18-19-20, Back Cover Globe Ticket Co	National Brake Co., Ioc. 21 National Pneumatic Co. 13 National Ry. Appliance Co. 41 Naugle Pole & Tic Co. 31	Star Brass Works 45 Stevena & Wood, Inc 30 Stone & Webster 30 Stucki Co., A. 31
Bates Expanded Steel Truss Co. 43 Beeler Organization	Gold Car Heating & Lighting Co. 31 Goodyear Tire & Rubber Co 27 Griffin Wheel Co 32	Nichols Lintern Co. 31 Nuttall Co., R. D. 34 Oakite Products, Inc. 41 Ohio Brass Co. 5	Timken Roller Bearing Co., Front Cover Tool Steel Gear & Pinion Co., The
Bethlehem Steel Co	Hale-Kilburn Co. 43 Haskelita Mfg. Corp. 31 "Help Wanted" Ads. 33 Hemphill & Wells 30	Ohio Brass Co. 5 Okonite-Callender Cable pany, Inc., The 43 Okonite Co., The 43	Una Welding & Bonding Co 31 Universal-Lubricating Co 44 Van Loan Corp., Irving 33
Chillingworth Mfg. Co 31 Cincinnati Car Co	Holst Englehardt W	Page Steel & Wire Co	"Want" Ads
Cincinnati Steel Railway Co 33 Cleveland Fare Box Co 44 Collier, Inc., Barroo G 39 Columbia Machine Work6 32	Irvington Varnish & Insulator Co	Rail Joint Co	Westinghouse Traction Brake Co. 6 Wharton, Jr. & Co., Inc., Wm. 41 "What and Where to Buy" 40-42-45
Commonwealth Steel Co 34 Consolidated Car Fender Co 31 Consolidated Car Heating Co 33	Jackson, Walter 30 Johnson Fare Box Co 41 Kelker, DeLeuw & Co 30	Ramapo Ajax Corp. 44 Richey, Albert 30 Roebling's Sons Co., John A. 43	White Eng. Corp., The J. G 36 Winnipeg Electric Co 33 Wisconsin Power & Light Co 33 Wish Service, The P. Edw 31
Day & Zimmerman, lnc 30 Differential Steel Car Co., Thc 44	Kuhlman Car Co46. Third Cover Lorain Steel Co45	Safety Car Devices Co	Yellow Truck & Coach Co., Insert 23, 24, 25, 26

WHAT AND WHERE TO BUY-Continued from page 42

Tools, Track & Miscella-neous
American Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Railway Trackwork Co.
Ramapo-Ajax Corp.

Towers and Transmission
.Structure
American Bridge Co.
Bates Expanded Steel
Truse Co.
Westinghouse E. & M. Co.

Track Grinder Metal & Thermit Corp. Railway Trackwork Co. Ramapo-Ajax Corp.

Track, Special Work Columbia Machine Worka Ramapo Ajax Corp.

Trackless Trolley Cars Brill Co., The J. G.

Transfer Issuing Machines Ohmer Fare Register Co.

Transformers
General Electric Co.
Wastinghouse E. & M. Co.

Treada, Safety Stair, Car Step Cincinnati Car Co.

Tree Wire Okonita Co. Okonita-Callender Cable Co.

Trolley Bases
National Bearing Metala
Corp.
R. D. Nuttall Co.
Ohlo Brass Co.

Trolley Bases, Retrieving
R. D. Nuttall Co.
Ohio Brasa Co.

Onto Brass Co.
Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.
Trolley Material, Overhead
Elec. Service Supplies Co.
General Electric Co.
National Bearing Metals
Corn.

National Bearing
Corp.
Ohio Brass Co.
Westinghouse E. & M. Co.
Trolley Wheel Bushings
National Bearing Metals

Corp. Star Brass Works Trolley Wheels (See Wheels Trolley)

Trolley Wire
Amer. Electrical Works
American Brass Co.
American Steel & Wirs Co.
Anaconda Copper Min. Co.
Page Steel & Wire Co.
Roebling's Sons Co., J. A.

Trucka, Car Bemis Car Truck Co. Brill Co., The J. G. Cincinnati Car Co. Commonwealth Steel Co.

Trucka, Motor White Company

Truss Planks Haskelite Mfg. Corp. Tubing, Yellow and Black Flexible Varnish Irvington Varnish & Ins.

Turblues, Steam General Electric Co. Westinghouse E. & M. Co. Turntablea Elec. Service Supplies Co.

Turnatiles
Elec. Servica Supplies Co.
Perey Mfg. Co., Inc.

Valves Ohio Brass Co. Westinghouse Tr. Br. Co Varnished Papers and Silks Irvington Varnish & Inc. Co.

Ventilators, Car Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Heating

Co.
Nichols-Lintern Co.
Nat'l, Ry. Appliance Co.
Railway Utility Co.

Vestibule Linings Haskelite Mfg. Corp.

Wrlded Rail Joints Metal & Thermit Corp. Rallway Trackwork Co. Una Welding & Bonding Co.

Waldere, Portable Electric General Electric Co. Ohio Brasa Co. Railway Trackwork Co. Una Welding & Bonding Co. Weatinghouse E. & M. Co.

Weldera, Rail Joint General Electric Co. Ohio Brasa Co. Railway Trackwork Co.

Railway Trackwork Co.

Welding Processes and
Apparatus
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.
Welding, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.
Wriding Wire

Wrlding Wire
American Steal & Wire Co.
Rallway Trackwork Co.
Roebling's Sons Co.. J. A.

Welding Wire and Rods Page Steel & Wire Co. Railway Trackwork Co.

Wheel Guards (See Fenders and Wheel Gnards)

Wheel Presses (See Machine Tools)

Wheels, Car, Steel & Steel Tire American Steel Foundries Bemla Car Truck Co.

Griffin Wheel Co. Standard Steel Works

Wheels, Trolley
Columbia Machine Worka
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Bearing Metals
Corp.
R. D. Nuttall Co.
Ohio Brass Co.
Star Brass Works

Whiatles, Air Ohlo Brasa Co. Weatinghouse E. & M. Co. Weetinghouse Traction Brake Co.

Window Guards & Fittings Cincinnati Car Co.

Wire Copper Covered Steel Page Steel & Wire Co.

Wire Rope American Steel & Wire Oo Roebling's Sons Co., J. A.

Wires and Cables Wires and Cubles
American Brass Co.
American Electrical Works
American Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Okonite-Callender Cable Co
Inc.
Page Steel & Wire Co.
Roebling's Sons Co., J. A.
Westinghnuse E. & M. Co.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa. Soles Offices:

Atlanta Chicago · Philadelphia Cleveland Pitteburgh

New York Dallas

Pacific Coast Representative:
United States Steel Products Company
Portland San Francisco Los Angeles

Export Representative:
United Stetes Steel Products Company, New York, N. Y.

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.



"Comfortable Seats Are Greatest Asset"



No. 201-B-1 Type

This statement of one Brooklyn, New York, resident is typical of the enthusiasm expressed for the seating equipment of "The Car for 1928."

The approval and interest in these Brill Seats by the riding public is due, no doubt, to the deep spring leather upholstered cushions and the comfortable semi-individual type backs.

The 201-B-1 type seats are equally satisfactory from the operator's point of view because of their simple reversing mechanism and light weight yet sturdy construction.

IN designing the Brill 1928 Model Electric Car, it was the aim of Brill Engineers to provide attractive appearance, greater riding comfort and more efficient operation.

Brake and acceleration tests proved beyond doubt that "The Car for 1928" could not only improve schedule speed but operate economically and with much less noise.

It was believed that the attractive appear-

The J. G. Brill Company Philadelphia

American Car Company St. Louis ance and comfortable riding qualities would favorably impress the public. This belief was given substantiation by the thousands of comments received. Space permits the quotation of only a few of these comments. "A new era in electric car comfort," "The new Brill Car is one of the greatest achievements made by any electric car builder. It is a step toward better transportation," "The comfort afforded by the Brill 1928 Model Car is most gratifying."

Write for specification details and interesting test reports.

The G. C. Kuhlman Car Co. Cleveland

Wason Mfg. Company Springfield, Mass.





Modernizing Controllers on the B.M.T.

In its program of modernization, the Brooklyn Manhattan Transit Corporation chose G-E quality parts, including 16,100 hinged-type fingers. This new finger becomes an integral part of the controller and, since it is equipped with a removable tip, will not normally require replacement. It is self-aligning; hence it gives full-width contact under all operating conditions. It will not break or bend in the most severe service.

You, too, can minimize your maintenance costs by replacing worn-out and obsolete fingers with the new G-E self-aligning finger.

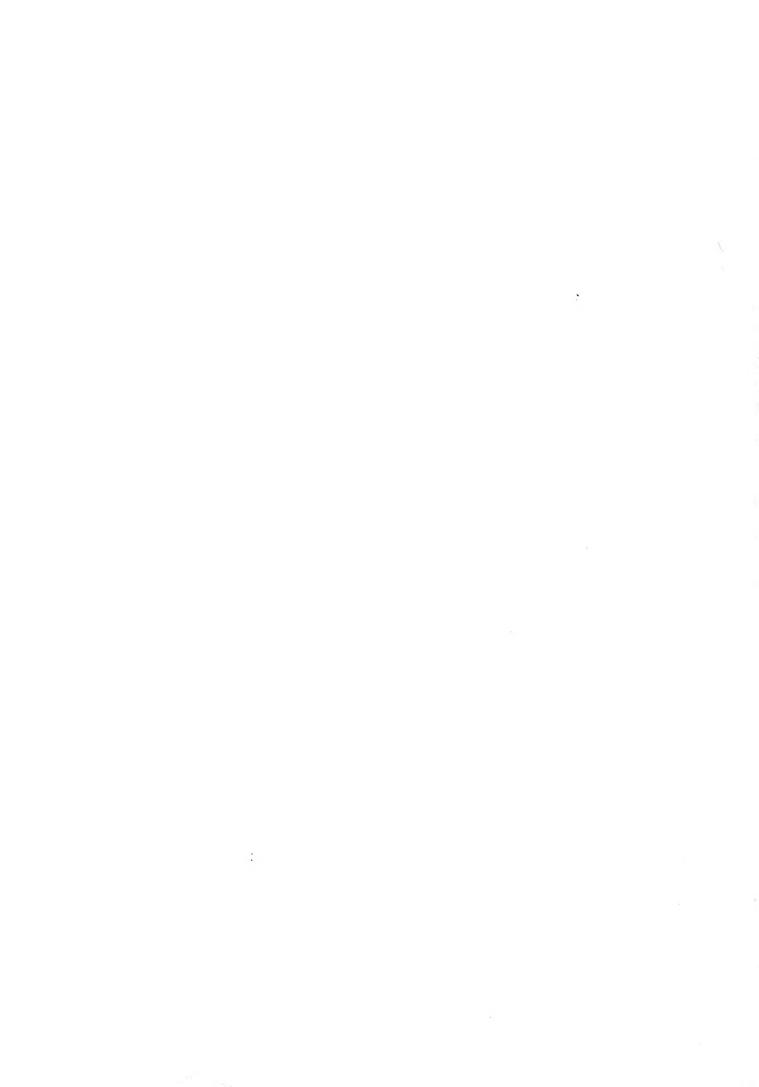
330-66



General Electric renewal parts are designed and built especially for G-E equipment. Safeguard this equipment by using the Renewal Parts Catalog which General Electric has compiled for you individually.

GENERAL ELECTRIC

4				
	9.			
		141:		
	•			
	= £ .			
			with the second	



	; =		

			Y
		·, ·	
;			



